

Appendix A

*Description of GIS Geologic Units,
Snake/Salt River Basin, Wyoming,
and Idaho*

This appendix describes the 90 digital Geographic Information System (GIS) geologic units that comprise the Snake/Salt River Basin (SSRB) of Wyoming and Idaho. The stratigraphic descriptions in this appendix are for the units shown on Plate I. The 90 digital GIS geologic units are distributed as follows:

Wyoming 70 geologic units pages A-263 - 269
Idaho 20 geologic units pages A-263 - 269

These geologic units are compiled from the 1:500,000-scale digital state maps that cover the SSRB. The maps give a code and rock-type description to each unit within the mapped state; each state has its own set of codes, and neither codes nor unit boundaries necessarily match across state lines.

In this appendix, for each state, each geologic unit symbol (**bold face**) and GIS definition (underlined) is followed by a description of the corresponding stratigraphic unit(s) as defined in that state. Plate 1 summarizes these determinations. Rock-stratigraphic units that appear in the right-hand column of Plate 1 are in **boldface**.

SNAKE/SALT RIVER BASIN GEOLOGIC UNITS – WYOMING

There are 70 digital GIS geologic units in the Wyoming portion of the Snake/Salt River Basin (Love and Christiansen, 1985). The stratigraphic descriptions below are taken directly from Love and Christiansen (1985) with minor modifications. Unit labels for Idaho can be found at the end of the unit description for correlative units.

References

- Love, J.D., and Christiansen, A.C., *compilers*, 1985, Geologic map of Wyoming: U.S. Geological Survey, scale 1:500,000, 3 sheets.
Love, J.D., Christiansen, A.C., and Ver Ploeg, A.J., *compilers*, 1993, Stratigraphic chart showing the Phanerozoic nomenclature for the state of Wyoming: Geological Survey of Wyoming Map Series 41 (MS-41).

Symbol Unit Description

CENOZOIC GEOLOGIC UNITS – WYOMING

Quaternary geologic units – Wyoming and Idaho

- Qa Alluvium and colluvium (Holocene-Pleistocene) – Clay, silt, sand, and gravel in flood plains, fans, terraces, and slopes.
Qt Gravel, pediment, and fan deposits (Holocene-Pleistocene) – Mostly locally derived clasts; locally includes some Tertiary gravel.
Qg Glacial deposits (Holocene-Pleistocene) – Till and outwash of sand, gravel, and boulders.
Qls Landslide deposits (Holocene-Pleistocene) – Local intermixed landslide and glacial deposits, talus, and rock-glacier deposits.
Qb Basalt flows and intrusive igneous rocks (Holocene-Pleistocene) – Exposed in the Yellowstone area and in and adjacent to Absaroka Range of northwestern Wyoming. Idaho-**Qpub**
Qr Rhyolite flows, tuff, and intrusive igneous rocks (Holocene-Pleistocene) – Includes Plateau Rhyolite and interlayered sediments. Idaho-**Qpu3f**

Quaternary and Tertiary geologic units – Wyoming and Idaho

- QTc Conglomerate (Pleistocene and (or) Pliocene) – Partly consolidated gravel above and flanking

some major streams.

Uncorrelated Idaho geologic units: Qpg- Glacial outwash, conglomerate, flood and terrace gravels

Tertiary geologic units – Wyoming and Idaho

- Thr Huckleberry Ridge Tuff of Yellowstone Group (Pliocene) – Lavender to gray-brown welded rhyolite tuff.
- Tii Intrusive and extrusive rocks (Pliocene and Miocene) – Igneous rocks, in composition from hornblende monzonite to basalt; in Yellowstone area includes andesite and basalt of Emerald Lake, rhyolite of Broad Creek, Pliocene Junction Butte Basalt, and gravel of Mount Evens.
- Thl Heart Lake Conglomerate (Pliocene and Miocene) – Yellowish-gray, composed of moderately small fragments of volcanic rock, chiefly rhyolite and rounded pebbles and cobbles of limestone and quartzite.
- Tsl Salt Lake Formation (Pliocene and Miocene) – White, gray, and green limy tuff, siltstone, sandstone, and conglomerate.
- Tsi Shooting Iron Formation (Pliocene) – Greenish-gray to pink tuffaceous lacustrine claystone and siltstone, fine-grained sandstone, and conglomerate.
- Tcc Conant Creek Tuff (Miocene) – Lavender rhyolite welded tuff.
- Tte Teewinot Formation (Miocene) – White lacustrine clay, tuff, and limestone.
- Tr Red conglomerate on top of Hoback and Wyoming Ranges (Miocene) – Locally derived clasts in a red clay and sand matrix.
- Tcd Camp Davis Formation (Miocene) – Red conglomerate and red claystone, underlain by white tuff.
- Tc Colter Formation (Miocene) – Dull-green gray tuff, volcanic conglomerate and sandstone.
- Ti Intrusive igneous rocks (Miocene) – Felsic and mafic plutonic igneous bodies, the larger ones dominantly felsic.

Uncorrelated Idaho geologic units: Tpd- Stream and lake deposits.

Symbol Unit Description

Absaroka Volcanic Supergroup

Thorofare Creek Group

- Twi Wiggins Formation (Eocene) – Light-gray volcanic conglomerate and white tuff, containing clasts of igneous rocks.
- Ttl Two Ocean and Langford Formations (Eocene) – Dark-colored andesitic volcaniclastic rocks and flows underlain by light-colored andesitic tuffs and flows.
- Tc Aycross Formation (Eocene) – Brightly variegated bentonitic claystone and tuffaceous sandstone, grading laterally into greenish-gray sandstone and claystone; in and east of Jackson Hole contains gold-bearing lenticular quartzite conglomerate.

Thorofare Creek and Sunlight Groups

- Ttp Trout Peak Trachyandesite (Eocene) – Mixed clastic/volcanic and intermediate volcanic rocks.
- Tts Wapiti Formation (Eocene) – Andesitic volcaniclastic rocks.
- Thp Hominy Peak Formation (Eocene) – Mafic volcanic conglomerate and tuff.
- Tv Volcanic conglomerate (Eocene) – Dark-brown to black conglomerate, poorly bedded, composed chiefly of basalt clasts in a basaltic tuff matrix.
- Tcs Conglomerate of Sublette Range (Eocene) – Locally derived indurated angular conglomerate.
- Twd Diamictite and sandstone (Eocene) – Diamictite grades laterally into other members of the formation.

<u>Symbol</u>	<u>Unit Description</u>
Twdr	<u>Wind River Formation</u> (Eocene) – Variegated red and white claystone and siltstone; largely non-tuffaceous except near the top.
Twlc	<u>La Barge and Chappo Members of the Wasatch Formation</u> (Eocene) – Red, gray, and brown mudstone and conglomerate and yellow sandstone.
Tp	<u>Pass Peak Formation and equivalents</u> (Eocene) – Quartzite conglomerate with sandstone and claystone.
Tdb	<u>Devils Basin Formation</u> (Paleocene) – Light-gray sandstone, interbedded with green and gray claystone.
Th	<u>Hoback Formation</u> (Paleocene and Upper Cretaceous) – Light-to-dark gray mudstone, siltstone, and sandstone, with a few beds of coal.

Tertiary and Cretaceous geologic units – Wyoming

TKp	<u>Hoback Formation</u> (Paleocene and Upper Cretaceous) – Light-to-dark gray mudstone, siltstone, and sandstone, with a few beds of coal.
-----	--

Cretaceous geologic units – Wyoming and Idaho

Kha	<u>Harebell Formation</u> (Upper Cretaceous) – Gold-bearing quartzite conglomerate interbedded with olive-drab sandstone and green claystone.
Km	<u>Meeteetse Formation</u> (Upper Cretaceous) – Light-colored, massive to thin-bedded sandstone, gray sandy shale, and coal beds.
Kmv	<u>Mesaverde Formation or Group</u> (Upper Cretaceous) – Light-colored, massive to thin-bedded sandstone, gray sandy shale, and coal beds.
Kso	<u>Sohare Formation</u> (Upper Cretaceous) – Lenticular gray brown sandstone and shale; coal-bearing in lower part. Gray to tan sandstone and thick coal beds; gold-bearing quartzite conglomerate in the lower part.
Ksb	<u>Sohare Formation and Bacon Ridge Sandstone</u> (Upper Cretaceous) – Lenticular gray brown sandstone and shale; coal-bearing in lower part.
Kc	<u>Cody Shale</u> (Upper Cretaceous) – Dull-gray shale, gray siltstone, and fine-grained sandstone.
Kbb	<u>Blind Bull Formation</u> (Kbb) (Upper Cretaceous) – Gray to tan conglomeratic sandstone, siltstone, claystone, coal, and bentonite.
Kb	<u>Bacon Ridge Sandstone</u> (Upper Cretaceous) – Gray to tan sandstone and thick coal beds; gold-bearing quartzite conglomerate in the lower part.
Kft	<u>Frontier Formation and Mowry and Thermopolis Shales</u> (Upper Cretaceous) <ul style="list-style-type: none"> <u>Frontier Formation</u> – South Wyoming – Gray sandstone and sandy shale. <u>Mowry Shale</u> (Upper Cretaceous) – Silvery-gray, hard, and siliceous shale containing abundant fish scales and bentonite beds. <u>Thermopolis Shale</u> (Lower Cretaceous) – Black, soft, and fissile shale with Muddy Sandstone Member at top of unit.
Kss	<u>Sage Junction, Quealy, Cokeville, Thom as Fork, and Smiths Formations</u> (Lower Cretaceous) <ul style="list-style-type: none"> <u>Sage Junction Formation</u> – Gray and tan siltstone and sandstone. <u>Quealy Formation</u> – Variegated mudstone and tan sandstone. <u>Cokeville Formation</u> – Tan sandstone, claystone, limestone, bentonite, and coal. <u>Thomas Fork Formation</u> – Variegated mudstone and gray sandstone. <u>Smith Formation</u> – Ferruginous black shale and tan to brown sandstone.

<u>Symbol</u>	<u>Unit Description</u>
Ka	<u>Aspen Shale</u> (Lower Cretaceous) – Light to dark-gray siliceous tuffaceous shale and siltstone, thin bentonite beds, and quartzitic sandstone.
Kmt	<u>Mowry and Thermopolis Shales</u> (Upper to Lower Cretaceous) <u>Mowry Shale</u> (Upper Cretaceous) – Silvery-gray, hard, siliceous shale containing abundant fish scales and bentonite beds. <u>Thermopolis Shale</u> (Lower Cretaceous) – Black soft fissile shale with Muddy Sandstone Member at top of unit.
Kws	<u>Wayan and Smiths Formation</u> (Lower Cretaceous) – Tan quartzite sandstone in upper part and black shale in lower part.
Kbr	<u>Bear River Formation</u> (Lower Cretaceous) – Black shale, fine-grained brown sandstone, thin limestone, and bentonite beds.
Kg	<u>Gannett Group</u> (Lower Cretaceous) – Red sandy mudstone, sandstone, and chert-pebble conglomerate; thin limestone and dark-gray shale in upper part, more conglomeratic in lower part. Includes Smoot Formation (red mudstone and siltstone), Draney Limestone, Bechler Conglomerate, Peterson Limestone, and Ephraim Conglomerate. Upper Jurassic fossils have been reported from the Ephraim. Uncorrelated Idaho geologic units: Ku- Upper Cretaceous thick detrital and fresh-water limestone beds. Kl-Lower Cretaceous shale, siltstone, red bed sandstone and fresh-water limestone.

Cretaceous and Jurassic geologic units – Wyoming

KJ	<u>Cloverly and Morrison Formations</u> (Lower Cretaceous to Jurassic) <u>Cloverly Formation</u> – Rusty-color sandstone at top, underlain by brightly variegated bentonitic claystone; chert-pebble conglomerate locally at base. <u>Morrison Formation</u> – Dully variegated, siliceous claystone, nodular white limestone, and gray silty sandstone.
KJg	<u>Cloverly, Morrison, Sundance, and Gypsum Formations</u> (Lower Cretaceous to Jurassic) <u>Cloverly Formation</u> – Rusty-color sandstone at top, which overlies brightly variegated bentonitic claystone; chert-pebble conglomerate locally at the base. <u>Morrison Formation</u> – Dully variegated, siliceous claystone, nodular white limestone, and gray silty sandstone. <u>Sundance Formation</u> – Greenish-gray glauconitic sandstone and shale, underlain by red and gray non-glauconitic sandstone and shale. <u>Gypsum Formation</u> – Interbedded red shale, dolomite, and gypsum.

Jurassic geologic units – Wyoming and Idaho

Jst	<u>Stump Formation, Preuss Sandstone or Redbeds, and Twin Creek Limestone</u> (Upper and Middle Jurassic) <u>Stump Formation</u> – Glauconitic siltstone, sandstone, and limestone. <u>Preuss Sandstone or Redbeds</u> – Purple, maroon, and reddish-gray sandy siltstone and claystone; contains salt and gypsum in thick beds in some subsurface sections. <u>Twin Creek Limestone</u> – Greenish-gray shaly limestone and limy siltstone. Includes Gypsum Spring Member. Idaho-Ju
Jsg	<u>Sundance and Gypsum Spring Formations</u> (Jurassic) <u>Sundance Formation</u> – Greenish-gray glauconitic sandstone and shale, underlain by red and gray nongluconitic sandstone and shale. <u>Gypsum Spring Formation</u> – Interbedded red shale, dolomite, and gypsum.

<i>Symbol</i>	<i>Unit Description</i>
<i>Jurassic and Triassic geologic units – Wyoming and Idaho</i>	
JTR	<u>Sundance and Gypsum Springs Formation and Nugget Sandstone</u> (Jurassic and Triassic) <u>Sundance Formation</u> – Greenish-gray glauconitic sandstone and shale, underlain by red and gray nonglaucnitic sandstone and shale. <u>Gypsum Spring Formation</u> – Interbedded red shale, dolomite, and gypsum. <u>Nugget Sandstone</u> – Buff to pink crossbedded, well sorted quartz sandstone and quartzite.
JTrn	<u>Nugget Sandstone</u> (Jurassic and Triassic) – Buff to pink crossbedded well-sized and well-sorted quartz sandstone and quartzite; locally has oil and copper-silver-zinc mineralization.
JTrnd	<u>Nugget Sandstone and Chugwater and Dinwoody Formations</u> (Jurassic and Triassic) <u>Nugget Sandstone</u> – Buff to pink crossbedded, well sorted quartz sandstone and quartzite. <u>Chugwater Formation</u> – Composed of red siltstone and shale. <u>Dinwoody Formation</u> – Olive-drab hard dolomitic thin-bedded siltstone and green shale. Idaho-J
<i>Triassic geologic units – Wyoming and Idaho</i>	
TKad	<u>Ankareh Formation, Thaynes Limestone, Woodside Shale, and Dinwoody Formation</u> (Upper and Lower Triassic) <u>Ankareh Formation</u> – Red and maroon shale and purple limestone. <u>Thaynes Limestone</u> – Gray limestone and limy siltstone. <u>Woodside Shale</u> – Red siltstone and shale. <u>Dinwoody Formation</u> – Gray to olive-drab dolomitic siltstone.
TKcd	<u>Chugwater and Dinwoody Formations</u> (Upper and Lower Triassic) <u>Chugwater Formation</u> – Red siltstone and shale. <u>Alcova Limestone Member</u> in upper middle part in north Wyoming. Thin gypsum partings near base in north and northeast Wyoming. <u>Dinwoody Formation</u> – North Wyoming – Olive-drab hard dolomitic thin-bedded siltstone. Uncorrelated Idaho geologic units: TR- Sallow-marine to non-marine sediments, TRI- oxidized shale, siltstone, limestone, and conglomerate sandstone, and TRU- Limestone and chert above sandstone, siltstone and limestone.
<i>Permian geologic units – Wyoming</i>	
Pp	<u>Phosphoria Formation</u> (Permian) – Upper part is dark- to light-gray chert and shale with black shale and phosphorite at top; lower part is black shale, phosphorite, and cherty dolomite. Idaho-P
<i>Permian, Pennsylvanian, and Mississippian geologic units – Wyoming and Idaho</i>	
PPMa	<u>Phosphoria, Wells, and Amsden Formations</u> (Permian-Upper Pennsylvanian) <u>Phosphoria Formation</u> (Permian) – Upper part is dark- to light-gray chert and shale with black shale and phosphorite at top; lower part is black shale, phosphorite, and cherty dolomite. <u>Wells Formation</u> – Gray limestone interbedded with yellow limy sandstone. <u>Amsden Formation</u> – Red and gray cherty limestone and shale, sandstone, and conglomerate. Uncorrelated Idaho geologic unit: PPNC- Thrusted, marine detritus.
PPM	<u>Wells and Amsden Formations</u> (lower Permian-Upper Mississippian) <u>Wells Formation</u> – Gray limestone inter bedded with yellow limy sandstone. <u>Amsden Formation</u> – Red and gray cherty limestone and shale, sandstone, and conglomerate.

<i>Symbol</i>	<i>Unit Description</i>
<i>Pennsylvanian and Mississippian geologic units – Wyoming</i>	
PM	<p><u>Tensleep Sandstone and Amsden Formation</u> (lower Permian to Upper Mississippian) <u>Tensleep Sandstone</u> (Lower Permian to Upper Mississippian) – South Wyoming – White to gray sandstone containing thin limestone and dolomite beds. <u>Amsden Formation</u> (lower Permian to Middle Pennsylvanian) – South Wyoming – Red and green shale and dolomite with a persistent red to brown sandstone at base.</p>
<i>Mississippian and Devonian geologic units – Wyoming and Idaho</i>	
MD	<p><u>Madison Group and Darby Formation</u> (Upper Mississippian-Upper Devonian) <u>Madison Limestone or Group</u> – Group includes Mission Canyon Limestone (blue-gray, massive limestone and dolomite), underlain by Lodgepole Limestone (gray cherty limestone and dolomite). Idaho-Ms <u>Darby Formation</u> – Yellow and greenish-gray shale and dolomitic siltstone underlain by fetid brown dolomite. Uncorrelated Idaho geologic unit– DSc- Deep-water argillite and quartzite.</p>
<i>Ordovician and Cambrian geologic units – Wyoming</i>	
O€	<p><u>Bighorn Dolomite, Gallatin Limestone, and Gros Ventre Formation</u> (Upper Ordovician-Middle Cambrian) <u>Bighorn Dolomite</u> – Gray massive cliff-forming siliceous dolomite and locally dolomitic limestone. <u>Gallatin Limestone</u> – Gray and tan limestone. <u>Gros Ventre Formation</u> – Greenish-gray micaceous shale.</p>
<i>Precambrian geologic units – Wyoming</i>	
Wgn	<u>Granite gneiss</u> (Precambrian – Late Archean) - Layered to massive, locally migmatitic; metasedimentary and metavolcanic rocks.
WVsv	<u>Metasedimentary and metavolcanic rocks</u> (Precambrian – Late Archean)- Amphibolite, hornblende gneiss, biotite gneiss, quartzite, iron-formation, metaconglomerate, marble, and pelitic schist; locally preserved textures and structures suggest origin to be sedimentary or volcanic.
Wmu	<u>Granitic rocks</u> (Precambrian – Late Archean)- Granite
Ugn	<u>Oldest gneiss complex</u> (Precambrian – Early Archean) - Area of migmatite related to emplacement of 2,600-Ma granite. These are the oldest rocks in Wyoming.

Appendix B

WWDC Groundwater Studies

Citation(s)	Aquifer/ Formation	Project Description	Results/Recommendations	Current Status
Wyoming River Basins Wyoming Water Planning Program, 1973, Wyoming's groundwater supplies: Cheyenne, Wyoming State Engineer's Office, Wyoming Water Planning Program Report, variously paged.	All	Summary of available groundwater and groundwater sources.	Predictions of aquifer water quantity throughout the state of Wyoming.	Statewide river basin water planning process continues
WWC Engineering, Inc., 2007, in association with Hinckley Consulting, Collins Planning Associates, Greenwood Mapping, Inc., and States West Water Resources Corporation, Wyoming framework water plan: prepared for the Wyoming Water Development Commission, Cheyenne, Wyo., v. 1 and 2, variously paged.				
Snake River Basin Sunrise Engineering, Inc., 2003, in association with Boyle Engineering, Inc., BBC Consulting, Inc., Hinckley Consulting, Fassett Consulting, Rendevous Engineering, and Nelson Engineering, Snake/Salt River Basin Plan, final report and technical memoranda; prepared for the Wyoming Water Development Commission, variously paged.	All	Develop basin plans with participation from local interest groups that provide defensible hydrologic data to quantify surface and ground water uses.	Current surface and ground water uses, water quality, future demand projects and future water use opportunities quantified and discussed. Continue with planning process with updates every five years.	Snake River Basin water planning process continues.
Afton Forsgren Associates, 1990, Afton municipal water supply Level II study, final report: prepared for the Wyoming Water Development Commission, variously paged.	Madison Limestone Amsden Formation		Assess the adequacy of the supply spring, and water facilities to meet Afton's water supply requirements. Analyses of water rights, infrastructure and economics. Provide conceptual design and cost estimates and environmental report.	Proposed PWS improvements are capable of serving Town of Afton by enhancing water collection and conveyance at Periodic Spring while providing reasonable protection of water facilities. Projects will entail significant funding.
Sunrise Engineering, Inc., 2006, Siting, construction and testing of the town of Afton new municipal East Alley Well: prepared for the Wyoming Water Development Commission, variously paged.	Alluvium		Level II status report to evaluate the hydrogeology of aquifer, determine depth to groundwater and aquifer thickness, complete and test new East Alley well, and assess groundwater quality.	East Alley well in alluvial formation was completed, developed and tested for aquifer hydraulics and water quality. Level III design and construction should proceed to connect well to PWS.

Appendix B. cont.

Citation(s)	Aquifer/ Formation	Project Description	Results/Recommendations	Current Status
Alpine Sunrise Engineering Inc., 1991, Alpine Junction water Level I study; prepared for the Wyoming Water Development Commission, variously paged.	Alluvial deposits Salt Lake Formation bedrock	Evaluate existing water supply, demands and facilities. Provide conceptual designs for regional water system, cost estimates and financing plans.	Proceed to Level II study. Drill and test a new test well, test several nearby wells and existing municipal wells. Prepare a revised cost estimate.	N/A
Rio Verde Engineering, 2001, Final report for the Alpine Spring irrigation supply project; prepared for the Wyoming Water Development Commission, variously paged.	Alluvial deposits	Evaluate Alpine spring for use in raw water irrigation system. Provide designs and cost estimates, economic analysis, environmental report, and analysis of state and federal permit requirements.	Project involves improvement of pond, spring area and irrigation distribution system. Project costs estimated at \$773K.	N/A
Alpine (cont.) Rendezvous Engineering, PC, 2009, in association with Hinckley Engineering, Alpine master plan update Level II, final report; prepared for the Wyoming Water Development Commission, variously paged.	Mission Canyon and Lodgepole Limestones	Evaluate existing water supply, demands and facilities. Provide conceptual designs for regional water system, cost estimates and financing plans	Improve existing PWS by installing larger pumps and new control system in existing wells. Complete and test new well.	
Alta Rendezvous Engineering, PC, 2002, in association with Hinckley Engineering, Final report - Alta master plan; prepared for the Wyoming Water Development Commission, variously paged.	Glacial and alluvial deposits and rhyolite welded tuffs	Level I study to evaluate existing water supply and system facilities, water supply needs and alternatives for the Alta area.	Existing wells meet current demand. New wells can be drilled in present wellfield. Storage, control and transmission improvements and cost estimates provided.	
Rendezvous Engineering, PC, 2007, in association with Hinckley Engineering, Final report - Level II - Alta groundwater supply study; prepared for the Wyoming Water Development Commission, variously paged.		Evaluate hydrogeology and existing water supply, demands and facilities. Provide conceptual designs, cost estimates and financing plans for supply and infrastructure additions and improvements.	Construct 2 new wells, upgrade existing well (T#1), install new control building and replace transmission lines. Cost estimates and user fee analysis provided.	
Bedford Forsgren-Perkins Engineering, 1986, Bedford water supply study Level I final report; prepared for the Wyoming Water Development Commission, variously paged.	Paleozoic aquifer	Level I study to evaluate existing water supply and system facilities, water supply needs and alternatives for the Town of Bedford.	Improve water delivery system from Big Spring. Develop additional springs. Form a Water and Sewer District. Continue project to Level II.	
Forsgren-Perkins Engineering, 1987, Bedford water supply study Level II final report; prepared for the Wyoming Water Development Commission, variously paged.		Conduct water rights research, economic evaluations, water quality analyses and more detailed cost analyses of proposed improvements to existing system and alternatives.	Rebuild existing spring collection facility and develop supplemental spring. Install new well and construct new water transmission line. File for needed water rights.	

Appendix B. cont.

Citation(s)	Aquifer/ Formation	Project Description	Results/Recommendations	Current Status
Buffalo Valley	Burnt Ridge Moraine aquifer	Level I study to define existing water supply and system facilities, water supply needs and alternatives for Buffalo Fork Subdivision.	Recommend water district be formed, Level II study, minor upgrades to Well #2, replace current storage tank and installation of new transmission line.	
Jorgensen Engineering and Land Surveying PC, 1996 in association with Hinckley Engineering, Final – Buffalo Valley Level I – water supply project report; prepared for the Wyoming Water Development Commission, variously paged.		Site, drill and test exploratory well. Analyze alternatives and permit requirements for water storage on National Forest Land.	Exploration well completed and pump tested. Production and water quality acceptable. Recommend new storage tank and supply line. Cost estimates and user fee analysis provided.	
Etna	Paleozoic aquifer and Salt Lake aquifers	Evaluate existing water supply, demands and facilities. Provide conceptual designs for regional water system, cost estimates and financing plans. Construct and test new well.	Improve existing spring collection facilities. New groundwater well installed and tested. Make water storage and transmission line improvements.	
Forsgren Associates, 1993, in association with Weston Engineering, Etna Water and Sewer District water supply system – part of the Star Valley Level II study, final report (revised); prepared for the Wyoming Water Development Commission, variously paged.	Tertiary aquifer	Level II study to evaluate existing water supply, demands and facilities. Provide conceptual designs, cost estimates and financing plans for improvements and additions.	Rehabilitate existing supply spring. Drill supplemental well. Transmission/distribution system requires improvements with cost estimates provided.	
Fairview	Star Valley municipal water supply Level II Study - report of the Fairview water supply system, final report (revised); prepared for the Wyoming Water Development Commission, variously paged.		Level II study to evaluate existing water supply, demands and facilities. Provide conceptual designs, cost estimates and financing plans. Design new well (see TriHydro report, below).	
Freedom	Salt Lake aquifer	Evaluate existing water supply, demands and facilities. Provide conceptual designs for regional water system, cost estimates and financing plans. Design new well (see TriHydro report, below).	New well completed and tested. Improve existing water transmission and delivery infrastructure; cost estimates provided.	
Forsgren Associates, 1992, Freedom Water and Sewer District water supply system – part of the Star Valley Level II study, final report (revised); prepared for the Wyoming Water Development Commission, variously paged.		Install Freedom No. 2 test well. Determine aquifer characteristics, evaluate water quality and conduct aquifer testing to determine feasibility of converting test well to a production well.	Completed test well met project production and water quality objectives. Move to Level III conversion to production well.	
TriHydro Corporation, 1993, Construction and testing report Freedom No. 2 test well, Freedom, Wyoming; prepared for the Wyoming Water Development Commission, variously paged.				

Appendix B. cont.

	Citation(s)	Aquifer/ Formation	Project Description	Results/Recommendations	Current Status
Grover	Forsgren Associates, 1991, Star Valley municipal water supply Level II Study- report of the Grover water supply system, final report; prepared for the Wyoming Water Development Commission, variously paged.	Salt Lake aquifer	Level II study to evaluate existing water supply, demands and facilities. Provide conceptual designs, cost estimates and financing plans for improvements and additions.	Retain 1 supply spring, abandon 2 others. Construct and test new well. Improve existing water transmission and delivery infrastructure; cost estimates provided.	
Hoback Junction	Forsgren Associates, 1991, Star Valley municipal water supply Level II Study- report of the Grover water supply system, final report; prepared for the Wyoming Water Development Commission, variously paged.	Paleozoic through Quaternary GW prospects evaluated	Level I study to identify water source with sufficient quantity and quality to meet domestic and fire protection demands at affordable cost. Identify water storage alternatives for Hoback Junction.	Recommend water district be formed and service area defined, project move to Level II study to fund completion of test well.	
Jackson	Nelson Engineering, 1984, Jackson water feasibility study, groundwater exploration program: prepared for the Wyoming Water Development Commission, variously paged.	Alluvial aquifer	Level I study to define existing water supply and system facilities, water supply needs and alternatives. Identify water source with sufficient quantity and quality to meet current and future demands.	Potential groundwater prospects identified and designed exploratory drilling program recommended.	
	Nelson Engineering, 1993, Town of Jackson groundwater exploration program, final report: final report: prepared for the Wyoming Water Development Commission, variously paged.		Project to locate and evaluate feasibility of developing groundwater supply source for Jackson. Evaluate and price permits required and treatment, transmission, control, and storage infrastructure needs.	Two exploration wells were drilled and tested. Manganese and iron levels were too high to treat economically in well #1 but water quality was acceptable in well #2. A water development plan was designed and cost estimates included.	
Kennington Springs	Keller Associates, Inc., 2003, Kennington Springs Pipeline Company Level I water system reconnaissance study, final report: prepared for the Wyoming Water Development Commission, variously paged.	Twin Creek aquifer	Provide comprehensive evaluation of the existing water system and make recommendations to meet requirements imposed by future growth in the area	Spring supplies adequate amounts of good quality water to residents. Transmission and distribution systems are in good condition. System improvements proposed along with cost estimates	

Appendix B. cont.

Citation(s)	Aquifer/ Formation	Project Description	Results/Recommendations	Current Status
North Alpine				
Rendezvous Engineering, PC, 2009, in association with Hinckley Consulting, Final report, Level II North Alpine water supply study; prepared for the Wyoming Water Development Commission, variously paged	Salt Lake aquifer	Level II study, evaluation of existing water system, improvement alternatives and cost estimates, financing options and permitting requirements.	Salt Lake aquifer wells provide adequate supplies of good quality water. Two new wells can be sited in present wellfield. Transmission/distribution system requires improvements with cost estimates provided.	N/A
Osmond				
Forsgren Associates, 1991, Star Valley municipal water supply Level II Study- report of the Osmond water supply system, final report; prepared for the Wyoming Water Development Commission, variously paged.	Mesozoic aquifer	Level II study to evaluate existing water supply, demands and facilities. Provide conceptual designs, cost estimates and financing plans for improvements and additions.	Redevelop existing supply spring. Consider future supplemental well. Transmission/distribution system requires improvements with cost estimates provided.	
Rafter J				
Jorgensen Engineering and Land Surveying PC, 1998 in association with Gordon-Prill-Drapes and Hinckley Engineering, Final – Rafter J water supply Level II study; prepared for the Wyoming Water Development Commission, variously paged.		Evaluate hydrogeology and existing water supply, demands and facilities. Provide conceptual designs, cost estimates and financing plans for supply and infrastructure additions and improvements.	Construct new well, well house with standby generator and transmission line. Make minor upgrades to existing storage tank.	
Smoot				
Forsgren Associates, 1991, Star Valley municipal water supply Level II Study- report of the Smoot water supply system, final report; prepared for the Wyoming Water Development Commission, variously paged.	Mesozoic aquifer	Level II study to evaluate existing water supply, demands and facilities. Provide conceptual designs, cost estimates and financing plans for improvements and additions.	Redevelop existing supply springs. Drill supplemental well. Transmission/distribution system requires improvements with cost estimates provided.	

Appendix B. cont.

Citation(s)	Aquifer/ Formation	Project Description	Results/Recommendations	Current Status
Squaw Creek AVI Professional Corporation, 1991, in association with Lidstone and Anderson, Inc., Level I study - Squaw Creek water supply project; prepared for the Wyoming Water Development Commission, variously paged.	Camp Davis, Cloverly Formations and Twin Creek Limestone Alluvial aquifer	Level I study to define existing water supply and system facilities, water supply needs and alternatives. Identify water source with sufficient quantity and quality to meet current and future demands. Level II study to evaluate existing water supply, demands and facilities. Provide conceptual designs, cost estimates and financing plans for improvements and additions. Two test wells drilled.	Investigate redevelopment of existing spring and development potential of other springs. Drill and test deep well. Revise plans and cost estimates pending results from well and spring tests.	
Lidstone and Anderson, Inc., 1994, in association with AVI Professional Corporation, Squaw Creek water supply project – Level II; prepared for the Wyoming Water Development Commission, variously paged.	Camp Davis and Nugget Formations	Level II study to explore feasibility of acquiring additional source supply. Evaluate system upgrades and fire protection.	Construct a test well or acquire existing well for supplemental supply. Construct a pipeline from new well to district system. Cost estimates provided.	
Star Valley Ranch Forsgren Associates, 1990, in association with Weston Engineering, Star Valley Ranch master plan; prepared for the Wyoming Water Development Commission, variously paged.	Paleozoic aquifer including Gallatin Limestone	Evaluation of existing water system, improvement alternatives and cost estimates, financing options and permitting requirements.	Further groundwater development is required to provide adequate and secure supply. Storage, transmission and distribution systems require additions and improvements with cost estimates provided.	

Appendix B. cont.

Citation(s)	Aquifer/ Formation	Project Description	Results/Recommendations	Current Status
Star Valley Forsgren Associates, 1989, Star Valley municipal water supply, Level I study: prepared for the Wyoming Water Development Commission, variously paged.	Paleozoic, Salt Lake	Level I study of six community water systems in Star Valley: Etna, Freedom, Grover, Fairview, Osmond and Shmot. Provide comprehensive evaluation of existing water systems.	Redevelop 8 of 9 supply springs, replace or renovate existing wells. Upgrade existing transmission and distribution systems. See Level II reports for named individual communities in this appendix.	Moving forward with drilling and testing of production scale wells.
Sunrise Engineering, Inc., 2009, Star Valley Regional Master Plan - Town of Afton – water system investigation and evaluation: prepared for the Wyoming Water Development Commission, variously paged.	Madison Limestone, Alluvium, Salt Lake, miscellaneous Paleozoic and Mesozoic aquifers	Evaluate water system, water rights, transmission and storage systems, water quality in Star Valley area.	Existing supplies from 24 wells and 16 springs with good water quality. Suggest development of regional system with cost estimates provided.	
Star Valley (cont.) Sunrise Engineering, Inc., 2009, Star Valley Regional Master Plan – North Alpine Service and Improvement District – water system investigation and evaluation: prepared for the Wyoming Water Development Commission, variously paged.	Madison Limestone, Alluvium, Salt Lake, miscellaneous Paleozoic and Mesozoic aquifers	Evaluate water system, water rights, transmission and storage systems, water quality in Star Valley area.	Existing supplies from 24 wells and 16 springs with good water quality. Suggest development of regional system with cost estimates provided.	
Sunrise Engineering, Inc., 2009, in association with Boyle Engineering, Harvey Economics, Rendezvous Engineering and Collins Planning Associates, Star Valley Regional Master Plan final report: prepared for the Wyoming Water Development Commission, variously paged.	Madison Limestone, Alluvium, Salt Lake, miscellaneous Paleozoic and Mesozoic aquifers	Evaluate water system, water rights, transmission and storage systems, water quality in Star Valley area.	Existing supplies from 24 wells and 16 springs with good water quality. Suggest development of regional system with cost estimates provided.	
Thayne Forsgren Associates, 1995, Thayne area water supply, Level I study: prepared for the Wyoming Water Development Commission, variously paged.	Salt Lake Formation	Evaluation of existing water system, improvement alternatives and cost estimates, financing options and permitting requirements.	Redevelop Flat Creek Springs. Construct supplemental groundwater well. Tie into Bedford system. Upgrade existing transmission and distribution systems.	N/A
Forsgren Associates, 1997, Thayne water supply, Level II study: prepared for the Wyoming Water Development Commission, variously paged.		Level II study to evaluate existing water supply, demands and facilities. Provide conceptual designs, cost estimates and financing plans for improvements and additions.	Redevelop Flat Creek Springs. Supplemental well was constructed and tested. Install meters. Upgrade existing transmission and distribution systems with cost estimates provided.	

Appendix C

*GIS Dataset Sources for Figures
and Plates*

Dataset	Presented in	Source
GEOLOGY		
Snake/Salt River Basin geology	Plate I, various figures	Modified from Vuke, Porter, et al., 2007 Love, J.D., Christiansen, A.C., 1985
Precambrian basement structure contour	Plate I	Modified from Blackstone, 1993
Precambrian basement faults	Plate I	Modified from Blackstone, 1993
cross-section lines	Plate I	WSGS
Lineaments	Plate I	Cooley, M. E., 1986
faults, Wyoming	Plate I, Plate II	Vuke, Porter, et al., 2007 Love, J.D., Christiansen, A.C., 1985
faults, Idaho	Plate I, Plate II	Love and Christiansen 1985, and Stoeser et al. 2005
Hydrogeology (includes aquifer outcrop areas)	Plate II, Figures 6-1, 6-2, 6-3, 6-4, 6-5, 6-6	T. Bartos, USGS, 2013
GROUNDWATER		
Aquifer recharge as a percent of precipitation	Figure 6-7	Modified from Hamerlinck and Arneson, 1998, and Daly and Taylor, 1998
Aquifer sensitivity	Figure 5-3	Hamerlinck and Arneson, 1998
Average annual precipitation, 1981-2010	Figure 3-3	PRISM Climate Group, Oregon State University
Environmental water sample locations		USGS, Environmental water sample locations GIS dataset of 2010
Estimated net annual aquifer recharge	Figure 5-2	Hamerlinck and Arneson, 1998
Produced water sample locations		WOGCC, Produced water database, 2009
Springs		Stafford and Gracias, WSGS, 2009
SWAP locations	Figure 5-11	Modified from Trihydro Corporation, 2004
WWDC potential groundwater development areas		Digitized from BRS, Inc., 2003e
Permitted wells	Figures 8-1, 8-2, 8-3, 8-4, 8-5, 8-6, 8-7	Wyoming State Engineer's Office, 2012 Idaho Department of Water Resources, 2012
POTENTIAL GROUNDWATER CONTAMINANTS		
Abandoned mine sites	Figure 5-7	Created from WDEQ Abandoned Mine Land table of 2010
Active coal mine	Figure 5-8	WDEQ, Land Quality Division, 2012
Active disposal and injection wells	Figure 5-4	Modified from WOGCC well header data as of 2009
Small, Limited, and Regular Mining Permits	Figure 5-8	WDEQ LQD, 2012
Non Coal Mines	Figure 5-8	WDEQ LQD, 2011
Storage tanks	Figure 5-10	Modified from WDEQ Solid and Hazardous Waste Division (SHWD) storage tank table of 2009
Active Wyoming Pollutant Discharge Elimination System (WYPDES) outfalls	Figure 5-6	WDEQ Water Quality Division (WQD) WYPDES GIS dataset of 2009
Commercial oil and gas disposal pits	Figure 5-6	WDEQ/WQD commercial oil and gas disposal pit GIS dataset of 2012

Appendix C. cont.

Dataset	Presented in	Source
Pollution Control Facilities	Figure 5-6	WDEQ/WQD Groundwater Program known contaminated areas GIS dataset of 2012
Oil and gas fields	Figure 5-4	De Bruin, 2007
Pipelines	Figure 5-4	Wyoming Pipeline Authority
Solid and hazardous waste facilities	Figure 5-10	Modified from WDEQ SHWD solid and hazardous waste facilities table of 2009
Underground Injection Control (UIC)		
Class I and V wells	Figure 5-5	Modified from WDEQ/WQD UIC GIS dataset of 2009
Voluntary Remediation Program (VRP) sites	Figure 5-10	Modified from WDEQ SHWD VRP tables and GIS datasets of 2009
WSGS mines, pits, mills, and plants	Figure 5-9	Harris, 2004

BASE DATA

Basin boundary	Plate I, various figures	Modified from USGS National Hydrography Dataset hydrologic units
Elevation	Plate I, various figures	Modified from U.S. Geological Survey, 1999
Hillshade	Plate I, various figures	USGS, 1999
Lakes	Plate I, various figures	USGS, National Hydrologic Dataset
Rivers	Plate I, various figures	USGS, National Hydrologic Dataset
Wyoming state boundary	Plate I, various figures	U.S. Department of Commerce, U.S. Census Bureau, Geography Division, 2010
Idaho state boundary	Plate I, various figures	U.S. Department of Commerce, U.S. Census Bureau, Geography Division, 2010
Wyoming counties	Plate I, various figures	U.S. Department of Commerce, U.S. Census Bureau, Geography Division, 2010
Idaho counties	Plate I, various figures	U.S. Department of Commerce, U.S. Census Bureau, Geography Division, 2010
Wyoming townships	Plate I, various figures	Premier Data Services, 2008
Idaho townships	Plate I, various figures	Bureau of Land Management
Mountain peaks	Physiographic features figure	WSGS, unpublished mountain peaks GIS dataset of 2008
Wyoming roads	Plate I, various figures	U.S. Department of Commerce, U.S. Census Bureau, Geography Division, 2010
Idaho roads	Plate I, various figures	U.S. Department of Commerce, U.S. Census Bureau, Geography Division, 2010
SSB Towns	Plate I, various figures	NAUS, 2003
Yellowstone Boundary	various figures	Spatial Analysis Center, Yellowstone National Park, 1995

Appendix D

Snake River Compact

SNAKE RIVER COMPACT, 1949

The States of Idaho and Wyoming, parties' signatory to this Compact, have resolved to conclude a compact as authorized by the Act of June 3, 1948 (62 Stat. 294), and after negotiations participated in by the following named State commissioners:

For Idaho:

Mark R. Kulp, Boise
N. V. Sharp, Filer
Charles H. Welteroth, Jerome
Roy Marquess, Paul
Ival V. Goslin, Aberdeen
R. Willis Walker, Rexburg
Alex O. Coleman, St. Anthony
Leonard E. Graham, Rigby
Charles E. Anderson, Idaho Falls
A. K. Van Orden, Blackfoot

For Wyoming:

L. C. Bishop, Cheyenne
E. B. Hitchcock, Rock Springs
J. G. Imeson, Jackson
David P. Miller, Rock Springs
Carl Robinson, Afton
Ciril D. Cranney, Afton
Clifford P. Hansen, Jackson
Clifford S. Wilson, Driggs, Idaho
Lloyd Van Deburg, Jackson

and by R. J. Newell, representative of the United States of America, have agreed upon the following articles, to-wit:

ARTICLE I

A. The major purposes of this compact are to provide for the most efficient use of waters of the Snake River for multiple purposes; to provide for equitable division of such waters; to remove causes of present and future controversies; to promote interstate comity; to recognize that the most efficient utilization of such waters is required for the development of the drainage area of the Snake River and its tributaries in Wyoming and Idaho; and to promote joint action by the states and the United States in the development and use of such waters and the control of floods.

B. Either State using, claiming or in any manner asserting any right to the use of the waters of the Snake River under the authority of either State shall be subject to the terms of this Compact.

ARTICLE II

As used in this Compact:

A. The term "Snake River" as distinguished from terms such as "Snake River and its tributaries" shall mean the Snake River from its headwaters to the Wyoming-Idaho boundary and all tributaries flowing into it within the boundaries of Wyoming, and the Salt River and all its tributaries

B. The terms "Idaho" and "Wyoming" shall mean, respectively, the State of Idaho and the State of Wyoming, and, except as otherwise expressly provided, either of those terms or the term "State" or "States" used in relation to any right or obligation created or recognized by this Compact shall include any person or entity of any nature whatsoever, including the United States;

C. The term "domestic use" shall mean the use of water by an individual, or by a family unit or household for drinking, cooking, laundering, sanitation and other personal comforts and necessities; and for the irrigation of a family garden or orchard not exceeding one-half acre in area;

D. The term "stock water use" shall mean the use of water for livestock and poultry

E. The term "established Wyoming rights" shall mean Snake River water rights that have been validly established of record in Wyoming prior to July 1, 1949, for use in Wyoming.

ARTICLE III

A. The waters of the Snake River, exclusive of established Wyoming rights and other uses coming within the provisions of (c) of this Article III, are hereby allocated to each State for storage or direct diversion as follows:

To Idaho	96 percent
----------------	------------

To Wyoming	4 percent
------------------	-----------

subject to the following stipulations and conditions as to the four percent allocated to Wyoming:

1. One-half may be used in Wyoming by direct diversion or by storage and subsequent diversion without provision being made for replacement storage space;

2. The other one-half may be diverted for direct use or stored for later diversion and use on the condition that there shall have been provided for reimbursement of Idaho users replacement storage space to the extent of one-third of the maximum annual diversion in acre-feet but not in excess, however, of one-third of half the total hereby allocated to Wyoming. Until this total replacement storage space has been made available, provision for meeting its proportionate part of this total shall be a prerequisite to the right to use water in Wyoming for any irrigation project authorized after June 30, 1949, for construction by any federal agency.

B. The amount of water subject to allocation as provided in (a) of this Article III shall be determined on an annual water-year basis measured from October 1 of any year through September 30 of the succeeding year. The quantity of water to which the percentage factors in (a) of this Article III shall be applied through a given date in any water year shall be, in acre-feet, equal to the algebraic sum of:

1. The quantity of water, in acre-feet, that has passed the Wyoming state line in the Snake River to the given date, determined on the basis of gaging stations to be established at such points as are agreed on under the provisions of (b) of Article VI;

2. The change during that water year to the given date in quantity of water, in acre-feet, in any existing or future reservoirs in Wyoming which water is for use in Idaho;

3. The quantity of water, in acre-feet, stored in that water year and in storage on the given date for later diversion and use in Wyoming, under rights having a priority later than June 30, 1949;

4. One-third of the quantity of water, in acre-feet, excluding any storage water held over from prior years, diverted, under rights having a priority later than June 30, 1949, in that water year to the given date:

- (a) From the Snake River for use that year on lands in Wyoming; and
- (b) From tributaries of the Salt River for use that year on lands in Idaho.

C. There are hereby excluded from the allocations made by this Compact:

1. Existing and future domestic and stock water uses of water; provided, that the capacity of any reservoir for stock water shall not exceed twenty (20) acre-feet;

2. Established Wyoming rights; and

3. All water rights for use in Idaho on any tributary of the Salt River heading in Idaho, which were validly established under the laws of Idaho prior to July 1, 1949; and all such uses and rights are hereby recognized.

ARTICLE IV

No water of the Snake River shall be diverted in Wyoming for use outside the drainage area of the Snake River except with the approval of Idaho; and no water of any tributary of the Salt River heading in Idaho shall be diverted in Idaho for use outside the drainage area of said tributary except with the approval of Wyoming.

ARTICLE V

Subject to the provisions of this Compact, waters of the Snake River may be impounded and used for the generation of electrical power, but such impounding and use shall be subservient to the use of such waters for domestic, stock and irrigation purposes, and shall not interfere with or prevent their use for such preferred purposes. Water impounded or diverted in Wyoming exclusively for the generation of electrical power shall not be charged to the allocation set forth in Article III of this Compact.

ARTICLE VI

A. It shall be the duty of the two States to administer this Compact through the official in each State who is now or may hereafter be charged with the administration of the public water supplies, and to collect and correlate through such officials the data necessary for the proper administration of the provisions of this Compact. Such officials may, by unanimous action, adopt rules and regulations consistent with the provisions of this Compact.

B. The States shall in conjunction with other responsible agencies cause to be established, maintained and operated such suitable water gaging stations as they find necessary to administer this Compact. The United States Geological Survey, or whatever federal agency may succeed to the functions and duties of that agency, so far as this Compact is concerned, shall collaborate with officials of the States charged with the administration of this Compact in the execution of the duty of such officials in the collection, correlation and publication of information necessary for its proper administration.

C. In the case of failure of the administrative officials of the two States to agree on any matter necessary to the administration of this Compact, the Director of the United States Geological Survey, or whatever official succeeds to his duties, shall be asked to appoint a federal representative to participate as to the matters in disagreement, and points of disagreement shall be decided by majority vote.

ARTICLE VII

A. Either State shall have the right to file applications for and receive permits to construct or participate in the construction and use of any dam, storage reservoir or diversion works in the other State for the purpose of conserving and regulating its allocated water and to perfect rights thereto. Either State exercising this right shall comply with the laws of the other State except as to any general requirement for legislative approval that may be applicable to the granting of rights by one State for the diversion or storage of water for use outside of that State.

B. Each claim or right hereafter initiated for storage or diversion of water in one State for use in the other State shall be filed in the office of the proper official of the State in which the water is to be stored or diverted, and a duplicate copy of the application, including a map showing the character and location of the proposed facilities and the lands to be irrigated, shall be filed in the office of the proper official of the State in which the water is to be used. If a portion or all the lands proposed to be reclaimed are located in a State other than the one in which the water is to be stored or diverted, then, before approval, said application shall be checked against the records of the office of the State in which the water is to be used, and a notation shall be placed thereon by the officer in charge of such records as to whether or not he approves the application. All endorsements shall be placed on both the original and duplicate

copies of all such applications and maps filed to the end that the records in both States may be complete and identical.

ARTICLE VIII

A. Neither State shall deny the right of the United States, and, subject to the conditions hereinafter contained, neither State shall deny the right of the other State to acquire rights to the use of

water, or to construct or participate in the construction and use of diversion works and storage reservoirs with appurtenant works, canals and conduits in one State for the purpose of diverting, conveying, storing or regulating water in one State for use in the other State, when such use is within the allocation to such State made by this Compact.

B. Either State shall have the right to acquire such property rights as are necessary to the use of water in conformity with this Compact in the other State by donation, purchase or through the exercise of the power of eminent domain. Either State, upon the written request of the Governor of the other State, for the benefit of whose water users' property is to be acquired in the State to which such written request is made, shall proceed expeditiously to acquire the desired property either by purchase at a price satisfactory to the requesting State, or, if such purchase cannot be made, then through the exercise of its power of eminent domain and shall convey such property to the requesting State or such entity as may be designated by the requesting State; provided, that all costs of acquisition and expenses of every kind and nature whatsoever incurred in obtaining the requested property shall be paid by the requesting State at the time and in the manner prescribed by the State requested to acquire the property.

C. Should any facility be constructed in either State by and for the benefit of the other State, as above provided, the construction, repair, replacement, maintenance and operation of such facility shall be subject to the laws of the State in which the facility is located, except that, in the case of a reservoir constructed in either State for the benefit of the other State, the proper officials of the State in which the facility is located shall permit the storage and release of any water to which the other State is entitled under this Compact.

D. Either State having property rights in the other State acquired as provided in B of this Article VIII shall pay to the political subdivisions of the State in which such property rights are located, each and every year during which such rights are held, a sum of money equivalent to the average annual amount of taxes assessed against those rights during the ten years preceding the acquisition of such rights in reimbursement for the loss of taxes to said political subdivision of the State, except that this provision shall not be applicable to interests in property rights the legal title to which is in the United States. Payments so made to a political subdivision shall be in lieu of any and all taxes by that subdivision on the property rights for which the payments are made.

ARTICLE IX

The provisions of this Compact shall not apply to or interfere with the right or power of either State to regulate within its boundaries the appropriation, use and control of waters allocated to such State by this compact.

ARTICLE X

The failure of either State to use the waters, or any part thereof, the use of which is allocated to it under the terms of this Compact, shall not constitute a relinquishment of the right to such use to the other State, nor shall it constitute a forfeiture or abandonment of the right to such use.

ARTICLE XI

In case any reservoir is constructed in one State where the water is to be used principally in the other State, sufficient water not to exceed five (5) cubic feet per second shall be released at all times, if necessary for stock water use and conservation of fish and wildlife.

ARTICLE XII

The provisions of this Compact shall remain in full force and effect unless amended or terminated by action of the legislatures of both States and consented to and approved by the Congress of the United States in the same manner as this Compact is required to be ratified and approved to become effective; provided, that in the event of such amendment or termination all rights theretofore established hereunder or recognized hereby shall continue to be recognized as valid by both States notwithstanding such amendment or termination.

ARTICLE XIII

Nothing in this Compact shall be construed to limit or prevent either State from instituting or maintaining any action or proceeding, legal or equitable, for the protection of any right under this Compact or the enforcement of any of its provisions.

ARTICLE XIV

A. Nothing in this Compact shall be deemed:

1. To affect adversely any rights to the use of the waters of the Snake River, including its tributaries entering downstream from the Wyoming-Idaho state line, owned by or for Indians, Indian tribes and their reservations. The water required to satisfy these rights shall be charged against the allocation made to the State in which the Indians and their lands are located;
2. To impair or affect any rights or powers of the United States, its agencies or instrumentalities, in and to the use of the waters of the Snake River nor its capacity to acquire rights in and to the use of said waters;
3. To apply to any waters within the Yellowstone National Park or Grand Teton National Park;
4. To subject any property of the United States, its agencies or instrumentalities to taxation by either State or subdivisions thereof, nor to create an obligation on the part of the United States, its agents or instrumentalities, by reason of the acquisition, construction or operation of any property or works of whatsoever kind, to make any payments to any State or political

subdivisions thereof, state agency, municipality or entity whatsoever in reimbursement for the loss of taxes;

5. To subject any works of the United States used in connection with the control or use of waters, which are the subject of this, Compact to the laws of any State to an extent other than the extent to which these laws would apply without regard to this Compact.

B. Notwithstanding the provisions of A of this Article, any beneficial uses hereafter made by the United States, or those acting by or under its authority, within either State, of the waters allocated by this Compact shall be within the allocations hereinabove made for use in that State and shall be taken into account in determining the extent of use within that State.

ARTICLE XV

This Compact shall become operative when approved by legislative enactment by each of the States, and when consented to by the Congress of the United States.

ARTICLE XVI

Wyoming hereby relinquishes the right to the allocation of stored water in Grassy Lake Reservoir, as set forth in Wyoming's reservoir Permit No. 4631 Res. and evidenced by Certificate No. R-1, page 318, and all claims predicated thereon.

IN WITNESS WHEREOF the Commissioners have signed this compact in quadruplicate, one (1) of which shall be filed in the archives of the Department of State of the United States of America and shall be deemed the authoritative original, and of which a duly certified copy shall be forwarded to the Governor of each of the States.

Done at the city of Cheyenne, in the state of Wyoming, this 10th day of October, in the year of our Lord, one thousand nine hundred and forty-nine.

Commissioners for Idaho	Commissioners for Wyoming
MARK R. KULP	L. C. BISHOP
N. V. SHARP	E. B. HITCHCOCK
CHARLES H. WELTEROTH	J. G. IMESON
ROY MARQUESS	DAVID P. MILLER
IVAL V. GOSLIN	CARL ROBINSON
R. WILLIS WALKER	CIRIL D. CRANNEY
ALEX O. COLEMAN	CLIFFORD P. HANSEN
LEONARD E. GRAHAM	CLIFFORD W. WILSON
CHARLES E. ANDERSON	LLOYD VAN DEBURG
A. K. VAN ORDEN	

I have participated in the negotiation of this Compact and intend to report favorably thereon to the Congress of the United States.

R. J. NEWELL

Representative of the United States of America

NOTES

Congressional Consent to Negotiations. --- By the Act of June 3, 1948 (62 Stat. 294), the Congress gave its consent to the negotiation of a Snake River Compact by the States of Idaho and Wyoming. The consent was given "upon condition that one suitable person, who shall be appointed by the President of the United States, shall participate in said negotiations as the representative of the United States and shall make report to the Congress of the proceedings and of any compact entered into." The Act also provided than any compact agreed upon shall not be effective until ratified by the Legislatures of the States and "approved" by the Congress and that "nothing in this Act shall apply to any waters within the Yellowstone National Park and Grand Teton National Park or shall establish any right or interest in or to any lands within the boundaries thereof or in subsequent additions thereto."

Congressional Consent to and Legislative History of the Compact. --- The "consent and approval" of the Congress was given the Snake River Compact by the Act of March 21, 1950 (64 Stat. 29), from which the text of the Compact above is taken. Section 2 of this Act "expressly reserved" the "right to alter, amend, or repeal this Act."

For legislative history, see S. 3159, 81st Congress; House Report 1743 (Committee on Public Lands), 81st Congress; 96 Cong. Rec. 2573-2575, 3063-3065 (1950); P.L. 464, 81st Congress.

Presidential and Budget Bureau Comments on Compact. --- In connection with the negotiations of the Yellowstone River Compact, the President expressed his views on certain provisions of the Snake River Compact in a letter to the Federal Representative dated May 3, 1950, to which was attached to a memorandum from the Director of the Bureau of the Budget dated April 21, 1950. The two documents read as follows:

May 3, 1950

"MY DEAR MR. NEWELL: The purpose of this letter is to call your attention to a problem of growing concern and, in the solution of which, the Federal Representatives assigned to interstate water compact commissions are in a position to perform a valuable public service. I refer to the somewhat recent tendency to incorporate in interstate water compacts questionable or conflicting provisions imposing restrictions on use of waters by the United States, such as appear in the Snake River Compact enactment, which I approved on March 21, 1950 (Public Law 464, 81st Congress, 2nd Session).

"In this particular case, the possibility of misinterpretation of certain apparently conflicting provisions was not considered to be serious enough to warrant withholding approval of the enrolled enactment of the Congress (S. 3159). Such provisions however, if followed as precedent for general application, may jeopardize the prospect of consent and approval of compacts by the Federal Government because of the far reaching effects such provisions might have upon the interests of the United States. This matter is further discussed in a memorandum to me from the Director of the Bureau of the Budget, a copy of which is enclosed for your information and guidance.

"I fully realize how difficult it is to resolve the numerous complexes jurisdictional and other problems encountered in reaching agreement upon the allocation of waters of an interstate stream. At the same time, I am impressed with the importance of insuring that compact provisions reflect as clearly

as possible a recognition of the respective responsibilities and prerogatives of the United States and the affected States. I can assure you that any efforts made by you and the other compact commissioners with whom you have occasion to collaborate in eliminating or correcting this area of possible conflict, will be appreciated.

"Sincerely yours,

"Harry S. Truman"

"April 21, 1950

"Memorandum for the President:

"Analysis of the enrolled enactment granting the consent and approval of the Congress to the Snake River Compact, prior to your approval on March 21, 1950, (Public Law 464, 81st Congress, 2nd Session), revealed the possibility of misinterpretation of certain apparently conflicting provisions, which did not appear to be serious enough in this particular case to provide a sound basis for recommending disapproval of the bill, but which, if followed as precedent for general application, might have far reaching effects upon the interests of the United States. The conflicts arise primarily between specific provisions imposing restrictions upon uses of water by the United States for power and other purposes, and the general savings clause in Article XIV. This article provides that nothing in the Compact shall be deemed to impair or affect any rights or powers of the United States in and to the use of the waters of the

Snake River nor its capacity to acquire rights in and to the use of said waters. By reason of such conflicts, doubts may rise as to the extent of the control which the States concerned may exercise over the rights, interests and structures owned or built by the United States on the river. The resulting possibility of confusion thus tends to defeat one of the basic purposes of the Compact, of settling the respective rights and interests of the Federal and State Governments in, over and to the river.

"The Committee on Public Lands of the House of Representatives, in its report on the bill (S. 3159) recorded its interpretation of the term "beneficial uses" appearing in Article XIV-B, as not regarded by the Committee as including the use and control of water by the United States by reason of its power with respect to navigable waters under the commerce clause of the Constitution (H. R. Report No. 1743, 81st Congress, 2nd Session). It is also significant that the Congress saw fit to include in the enactment a provision (Section 2) expressly preserving to the United States the right to alter, amend, and repeal the Act at any time.

"Somewhat similar provisions appear in the proposed Cheyenne River Compact now pending before Congress (H. R. 3336 and S. 1211) and in the Republican River Compact approved May 26, 1943, and the Belle Fourche River Basin Compact approved February 26, 1944. In approving each of these latter enactments, President Roosevelt issued a statement emphasizing that the procedure prescribed by the bill for exercise of the powers of the Federal Government, would not be entirely satisfactory in all circumstances and that these Compacts should not serve as precedents, particularly for streams where there appears to be a possible need for Federal comprehensive multiple purpose development or where opportunities for important electric power projects are present. Likewise, the Snake River Compact should not serve as a precedent.

"In its report in S. 3159 the Public Lands Committee of the Senate expressed the view that the compact method is the logical and proper manner to settle interstate water controversies. With this view, I am in accord but I am also mindful that Compact provisions, which are subject to misinterpretation or leave in doubt the respective rights and interests of the United States and the affected States, serve to impair these rights. It is obvious therefore, that the compact method places upon the compact commissioners the important responsibility of drawing compacts in specific and unequivocal language, devoid of all possible ambiguity, and which do not attempt to define, limit or otherwise determine the extent of the powers to be exercised by the United States which is a matter for determination by the Congress through Federal legislation as required.

"The importance of insuring that future compacts more adequately reflect a clear recognition of the respective responsibilities and prerogatives of the United States and the affected States, I believe is readily apparent. In formulating provisions of interstate water compacts, which impose restrictions upon use by the United States of waters in the streams concerned, the responsibility for protecting the rights and interests of the United States rests in the first instance upon those appointed to represent the Federal Government in negotiations with the State compact commissions. The Federal Representatives also are in a position to assist the compact commission in avoiding further use of questionable or conflicting provisions similar to the aforementioned, in order to minimize the possibility of disapproval of the compact by the State legislatures or the Federal Government, or the later possibility of prolonged and costly litigation.

"F.J. Lawton

"Director"

Appendix E-1

*Statistics for water samples,
Yellowstone Volcanic Area,
Wyoming*

Appendix E-1. Summary statistics for water samples, Yellowstone Volcanic Area, Wyoming.

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary alluvial aquifers (wells)	pH (standard units)	6.8	7.0	7.4	7.6	7.7	4
	Specific conductance ($\mu\text{S}/\text{cm}$)	168	173	180	215	247	4
	Hardness (as CaCO_3)	24.0	26.5	31.0	40.0	47.0	4
	Calcium	8.2	8.5	9.4	12.0	14.0	4
	Magnesium	0.70	1.2	1.8	2.6	3.2	4
	Sodium	23.0	24.0	26.0	33.5	40.0	4
	Potassium	3.2	3.7	4.2	4.8	5.3	4
	Sodium adsorption ratio (unitless)	1.9	1.9	2.2	2.5	2.5	4
	Alkalinity (as CaCO_3)	54.9	56.6	60.6	80.7	98.4	4
	Chloride	11.0	11.5	12.0	16.5	21.0	4
	Fluoride	2.3	2.4	2.7	3.0	3.2	4
	Silica	40.0	41.0	43.0	45.5	47.0	4
	Sulfate	2.5	3.1	5.2	6.9	7.0	4
	Total dissolved solids	131	135	147	202	248	4
	Aluminum	50.0	--	--	--	300	2
	Arsenic	20.0	--	--	--	50.0	2
	Barium	16.0	--	--	--	--	1
	Beryllium	<0.30	--	--	--	--	1
	Boron	50.0	--	100	--	150	3
	Cadmium	<30.0	--	--	--	--	1
	Chromium	<3.0	--	--	--	--	1
	Cobalt	<2.0	--	--	--	--	1
	Copper	2.0	--	--	--	20.0	2
	Iron	31.0	--	--	--	--	1
	Iron, unfiltered	60.0	--	130	--	160	3
	Lead	<1.0	--	--	--	--	1
	Lithium	34.0	--	--	--	40.0	2
	Manganese	<2.0	--	--	--	20.0	2
	Molybdenum	4.0	--	--	--	--	1
	Nickel	<2.0	--	--	--	--	1
	Selenium	2.0	--	--	--	--	1
	Strontium	24.0	--	--	--	--	1
	Vanadium	<2.0	--	--	--	--	1
	Zinc	<120	--	--	--	--	1
	Gross beta radioactivity (picocuries per liter)	3.6	--	--	--	3.8	2
	Uranium	--	--	--	--	<0.40	2

Appendix E-1. Summary statistics for water samples, Yellowstone Volcanic Area, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary terrace-deposit aquifers (wells)	pH (standard units)	7.6	--	7.8	--	7.9	3
	Specific conductance ($\mu\text{S}/\text{cm}$)	330	--	--	--	--	1
	Hardness (as CaCO_3)	178	--	182	--	190	3
	Calcium	48.0	--	50.0	--	51.9	3
	Magnesium	12.7	--	14.0	--	15.7	3
	Sodium	1.4	--	1.5	--	1.8	3
	Potassium	0.80	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.05	--	0.05	--	0.06	3
	Alkalinity (as CaCO_3)	169	--	172	--	174	3
	Chloride	0.10	--	1.3	--	1.5	3
	Fluoride	0.20	--	--	--	--	1
	Silica	15.0	--	--	--	--	1
	Sulfate	3.1	--	3.8	--	3.9	3
	Total dissolved solids	143	--	192	--	198	3
	Ammonia (as N)	0.02	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.92	--	1.1	--	1.8	3
	Nitrate (as N)	1.1	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	<0.01	--	--	--	--	1
	Phosphorus, unfiltered (as P)	<0.01	--	--	--	--	1
	Aluminum	<10.0	--	--	--	--	1
	Arsenic	<1.0	--	--	--	--	1
	Boron	10.0	--	--	--	--	1
	Chromium	<1.0	--	--	--	--	1
	Copper	3.0	--	--	--	--	1
	Lead	<1.0	--	--	--	--	1
	Mercury	<0.10	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
Quaternary glacial-deposit aquifers (wells)	pH (standard units)	7.8	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	110	--	--	--	--	1
	Hardness (as CaCO_3)	47.7	--	--	--	--	1
	Calcium	13.0	--	--	--	--	1
	Magnesium	3.7	--	--	--	--	1
	Sodium	4.0	--	--	--	--	1
	Potassium	0.90	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.25	--	--	--	--	1
	Alkalinity (as CaCO_3)	55.0	--	--	--	--	1
	Chloride	0.40	--	--	--	--	1
	Fluoride	0.20	--	--	--	--	1

Appendix E-1. Summary statistics for water samples, Yellowstone Volcanic Area, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary glacial-deposit aquifers (wells)—Continued	Silica	32.0	--	--	--	--	1
	Sulfate	1.4	--	--	--	--	1
	Total dissolved solids	91.0	--	--	--	--	1
	Ammonia (as N)	0.01	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.39	--	--	--	--	1
	Nitrate (as N)	0.39	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	0.02	--	--	--	--	1
	Aluminum	10.0	--	--	--	--	1
	Arsenic	<1.0	--	--	--	--	1
Quaternary and Tertiary volcanic rocks (basalt flows) (wells)	Boron	<10.0	--	--	--	--	1
	Cadmium	<10.0	--	--	--	--	1
	Chromium	<1.0	--	--	--	--	1
	Copper	1.0	--	--	--	--	1
	Iron	30.0	--	--	--	--	1
	Lead	3.0	--	--	--	--	1
	Manganese	16.0	--	--	--	--	1
	Mercury	<0.10	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
	Zinc	980	--	--	--	--	1
Quaternary and Tertiary volcanic rocks (rhyolite flows) (hot springs)	pH (standard units)	7.2	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	90.0	--	--	--	--	1
	Hardness (as CaCO_3)	30.0	--	--	--	--	1
	Calcium	10.0	--	--	--	--	1
	Magnesium	1.0	--	--	--	--	1
	Sodium	4.3	--	--	--	--	1
	Potassium	1.2	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.35	--	--	--	--	1
	Alkalinity (as CaCO_3)	32.8	--	--	--	--	1
	Chloride	1.1	--	--	--	--	1
Quaternary and Tertiary volcanic rocks (rhyolite flows) (hot springs)	Fluoride	0.10	--	--	--	--	1
	Silica	23.0	--	--	--	--	1
	Sulfate	0.80	--	--	--	--	1
	Total dissolved solids	69.0	--	--	--	--	1
	Iron, unfiltered	20.0	--	--	--	--	1
Quaternary and Tertiary volcanic rocks (rhyolite flows) (hot springs)	pH (standard units)	5.6	6.8	7.3	8.0	9.5	73
	Specific conductance ($\mu\text{S}/\text{cm}$)	835	940	1,180	1,520	1,650	8
	Hardness (as CaCO_3)	27.0	--	--	--	30.0	2
	Calcium	0.30	0.90	2.9	4.4	10.0	74
	Magnesium	0.01	0.05	0.05	0.19	1.0	73

Appendix E–1. Summary statistics for water samples, Yellowstone Volcanic Area, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary and Tertiary volcanic rocks (rhyolite flows) (hot springs)—Continued	Sodium	62.0	170	295	333	440	75
	Potassium	4.4	10.0	11.7	14.8	39.0	75
	Sodium adsorption ratio (unitless)	7.2	22.9	46.0	87.7	186	74
	Alkalinity (as CaCO_3)	44.3	230	307	432	737	74
	Chloride	36.0	87.0	123	183	363	75
	Fluoride	0.10	15.2	18.6	20.5	38.0	75
	Silica	98.0	181	230	286	415	74
	Sulfate	4.0	13.0	38.0	50.0	180	74
	Total dissolved solids	298	649	1,000	1,140	1,470	74
	Aluminum	--	150	230	290	470	22
	Arsenic	100	--	--	--	--	1
	Barium	--	--	--	--	<500	24
	Boron	--	1,400	1,900	2,300	8,200	75
	Cadmium	<10.0	--	--	--	--	1
	Chromium	<100	--	--	--	--	1
	Copper	<10.0	--	--	--	--	1
	Iron	<50.0	--	--	--	50	44
	Lead	<100	--	--	--	--	1
	Lithium	--	1,100	1,300	1,600	6,700	73
	Manganese	--	35.0	80.0	115	310	24
	Mercury	29.0	--	--	--	--	1
	Nickel	<100	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
	Strontium	--	--	--	--	<100	23
	Zinc	--	9.7	13.1	20.0	30.0	14
Quaternary and Tertiary volcanic rocks (rhyolite flows) (springs)	pH (standard units)	6.2	--	--	--	6.4	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	16.0	--	--	--	47.0	2
	Hardness (as CaCO_3)	4.0	--	--	--	15.0	2
	Calcium	1.4	--	--	--	4.8	2
	Magnesium	0.10	--	--	--	0.70	2
	Sodium	1.3	--	--	--	3.0	2
	Potassium	0.90	--	--	--	1.5	2
	Sodium adsorption ratio (unitless)	0.30	--	--	--	0.30	2
	Alkalinity (as CaCO_3)	7.0	--	--	--	19.0	2
	Chloride	0.30	--	--	--	0.60	2
	Fluoride	1.3	--	--	--	--	1
	Silica	16.0	--	--	--	31.0	2
	Sulfate	1.4	--	--	--	2.4	2
	Total dissolved solids	26.0	--	--	--	54.0	2

Appendix E-1. Summary statistics for water samples, Yellowstone Volcanic Area, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary and Tertiary volcanic rocks (Yellowstone Group) (hot springs)	pH (standard units)	4.6	7.6	8.1	8.7	9.9	10
	Calcium	0.90	0.94	1.2	3.3	10.0	11
	Magnesium	0.02	0.03	0.09	0.10	0.15	11
	Sodium	198	310	372	400	405	11
	Potassium	9.1	9.7	12.8	16.2	34.8	11
	Sodium adsorption ratio (unitless)	26.7	34.5	90.8	105	111	11
	Alkalinity (as CaCO_3)	122	258	270	318	338	7
	Chloride	140	236	295	310	360	11
	Fluoride	12.0	17.0	22.0	26.0	35.0	11
	Silica	181	214	271	330	340	11
	Sulfate	110	116	140	157	170	11
	Total dissolved solids	734	1,080	1,210	1,340	1,430	11
	Phosphorus (as P)	--	--	--	--	<2.0	4
	Aluminum	--	98.0	205	260	260	4
	Antimony	--	35.5	48.0	53.5	59.0	4
	Arsenic	--	1,045	1,400	1,500	1,600	4
	Barium	--	1.3	2.0	3.5	5.0	4
	Beryllium	--	2.6	4.0	4.7	5.1	4
	Boron	--	2,700	3,200	3,600	4,170	11
	Cadmium	--	--	--	--	<0.02	4
	Chromium	--	--	--	--	<1.0	4
	Cobalt	--	--	--	--	<0.02	4
	Copper	--	--	--	--	<0.50	4
	Iron	--	--	--	--	<30.0	4
	Lead	--	--	--	--	<0.05	4
	Lithium	--	3,100	4,600	6,200	6,400	11
	Manganese	--	0.27	0.59	14.5	28.0	4
	Mercury	--	0.05	0.05	0.06	0.06	4
	Molybdenum	--	74.0	95.0	98.0	100	4
	Nickel	--	--	--	--	<0.10	4
	Selenium	--	3.3	4.3	5.0	5.5	4
	Strontium	--	8.0	17.5	23.0	24.0	4
	Vanadium	--	2.0	2.0	2.5	3.0	4
	Zinc	--	--	--	--	<0.50	4
	Uranium	0.01	--	0.04	--	0.05	3
Quaternary and Tertiary volcanic rocks (Yellowstone Group) (springs)	pH (standard units)	6.1	6.7	7.0	7.1	7.2	6
	Specific conductance ($\mu\text{S}/\text{cm}$)	20.0	24.0	60.0	110	167	6
	Hardness (as CaCO_3)	6.2	7.3	15.0	18.0	25.0	6
	Calcium	1.8	2.1	5.1	6.2	7.4	6
	Magnesium	0.42	0.50	0.56	0.60	1.6	6

Appendix E-1. Summary statistics for water samples, Yellowstone Volcanic Area, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary and Tertiary volcanic rocks (Yellowstone Group) (springs)—Continued	Sodium	1.1	1.1	2.9	16.0	30.0	6
	Potassium	0.60	0.70	1.1	3.2	4.0	6
	Sodium adsorption ratio (unitless)	0.18	0.19	0.27	1.8	3.4	6
	Alkalinity (as CaCO_3)	9.0	11.0	25.4	40.2	57.0	6
	Chloride	0.10	0.20	0.55	7.0	20.0	6
	Fluoride	0.10	0.10	0.20	0.60	1.6	5
	Silica	10.0	11.0	26.5	37.0	67.0	6
	Sulfate	0.80	0.80	0.80	1.1	1.6	6
	Total dissolved solids	22.0	22.0	55.0	126	133	6
	Ammonia (as N)	<0.01	--	--	--	0.02	2
Quaternary and Tertiary volcanic rocks (Yellowstone Group) (wells)	Nitrate plus nitrite (as N)	<0.05	--	--	--	0.13	2
	Nitrate (as N)	<0.05	--	--	--	0.13	2
	Nitrite (as N)	--	--	--	--	<0.01	2
	Orthophosphate (as P)	--	--	--	--	<0.01	2
	Phosphorus, unfiltered (as P)	0.01	--	--	--	--	1
	Boron	60.0	--	--	--	180	2
	Iron, unfiltered	10.0	--	20.0	--	270	3
	pH (standard units)	7.9	8.0	8.0	8.1	8.1	6
	Specific conductance ($\mu\text{S}/\text{cm}$)	184	--	308	--	385	3
	Hardness (as CaCO_3)	143	144	152	187	190	5
Quaternary and Tertiary volcanic rocks (Yellowstone Group) (springs)—Continued	Calcium	40.0	40.4	42.5	48.0	56.0	5
	Magnesium	10.5	10.5	11.0	13.0	13.0	5
	Sodium	0.97	1.0	1.0	1.0	3.2	5
	Potassium	0.70	--	--	--	1.0	2
	Sodium adsorption ratio (unitless)	0.03	0.03	0.04	0.04	0.10	5
	Alkalinity (as CaCO_3)	136	136	144	155	194	5
	Chloride	0.73	0.74	0.89	1.8	6.8	6
	Fluoride	0.10	--	--	--	0.10	2
	Silica	14.0	--	--	--	17.0	2
	Sulfate	0.80	2.0	3.1	3.4	5.0	6
Quaternary and Tertiary volcanic rocks (Yellowstone Group) (wells)	Total dissolved solids	133	138	150	198	209	5
	Ammonia (as N)	0.02	--	--	--	--	1
	Nitrate plus nitrite (as N)	--	0.10	0.20	0.21	0.90	5
	Nitrate (as N)	0.09	--	--	--	--	1
	Nitrite (as N)	0.01	--	--	--	--	1
	Orthophosphate (as P)	0.01	--	--	--	--	1
	Aluminum	<100	--	--	--	--	1
	Antimony	<1.0	--	--	--	--	1
	Arsenic	<5.0	--	--	--	--	1

Appendix E-1. Summary statistics for water samples, Yellowstone Volcanic Area, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary and Tertiary volcanic rocks (Yellowstone Group) (wells)—Continued	Barium	<100	--	--	--	--	1
	Beryllium	<0.50	--	--	--	--	1
	Boron	--	--	--	--	<100	2
	Cadmium	<0.50	--	--	--	--	1
	Chromium	<50.0	--	--	--	--	1
	Copper	<10.0	--	--	--	--	1
	Iron	<50.0	--	--	--	--	1
	Lead	<1.0	--	--	--	--	1
	Manganese	<10.0	--	--	--	70.0	2
	Mercury	<0.50	--	--	--	--	1
	Nickel	<20.0	--	--	--	--	1
	Selenium	<5.0	--	--	--	--	1
	Zinc	<10.0	--	--	--	--	1
	Gross beta radioactivity (picocuries per liter)	2.7	--	--	--	--	1
Quaternary obsidian sand and gravel deposits underlying Lava Creek Tuff (Member B) of Yellowstone Group (wells)	Radium-226 (picocuries per liter)	0.30	--	--	--	--	1
	Radium-228 (picocuries per liter)	<1.0	--	--	--	--	1
	Uranium	0.004	--	--	--	--	1
	pH (standard units)	7.3	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	253	--	--	--	--	1
	Hardness (as CaCO_3)	59.0	--	--	--	--	1
	Calcium	14.0	--	--	--	--	1
	Magnesium	5.8	--	--	--	--	1
	Sodium	26.0	--	--	--	--	1
	Potassium	3.5	--	--	--	--	1
	Sodium adsorption ratio (unitless)	1.5	--	--	--	--	1
	Alkalinity (as CaCO_3)	90.2	--	--	--	--	1
	Chloride	16.0	--	--	--	--	1
	Fluoride	2.8	--	--	--	--	1
Madison aquifer (hot springs)	Silica	42.0	--	--	--	--	1
	Sulfate	3.0	--	--	--	--	1
	Total dissolved solids	183	--	--	--	--	1
	Boron	480	--	--	--	--	1
	Iron, unfiltered	130	--	--	--	--	1
	Manganese	40.0	--	--	--	--	1
	pH (standard units)	7.6	--	7.8	--	7.9	3
	Calcium	77.5	--	150	--	185	3
	Magnesium	14.6	--	29.0	--	35.0	3
	Sodium	143	--	290	--	380	3

Appendix E-1. Summary statistics for water samples, Yellowstone Volcanic Area, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Madison aquifer (hot springs)— Continued	Potassium	24.0	--	52.5	--	68.0	3
	Sodium adsorption ratio (unitless)	3.9	--	5.7	--	6.7	3
	Alkalinity (as CaCO_3)	298	--	536	--	539	3
	Chloride	139	--	145	--	201	3
	Fluoride	3.0	--	3.5	--	4.6	3
	Silica	60.8	--	60.8	--	61.6	3
	Sulfate	49.5	--	493	--	702	3
	Total dissolved solids	695	--	1,550	--	1,960	3
	Boron	1,700	--	3,000	--	4,000	3
	Lithium	950	--	1,450	--	1,950	3
Madison aquifer (springs)	pH (standard units)	7.3	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	450	--	--	--	--	1
	Hardness (as CaCO_3)	242	--	--	--	--	1
	Calcium	72.0	--	--	--	--	1
	Magnesium	15.0	--	--	--	--	1
	Sodium	1.0	--	--	--	--	1
	Potassium	0.40	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.03	--	--	--	--	1
	Alkalinity (as CaCO_3)	241	--	--	--	--	1
	Chloride	2.0	--	--	--	--	1
	Fluoride	0.10	--	--	--	--	1
	Silica	6.6	--	--	--	--	1
	Sulfate	2.4	--	--	--	--	1
	Total dissolved solids	245	--	--	--	--	1
	Ammonia (as N)	<0.01	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.21	--	--	--	--	1
	Nitrate (as N)	0.21	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	<0.01	--	--	--	--	1
	Phosphorus, unfiltered (as P)	<0.01	--	--	--	--	1
Madison aquifer (wells)	pH (standard units)	7.7	--	--	--	8.0	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	242	--	--	--	258	2
	Hardness (as CaCO_3)	120	--	--	--	132	2
	Calcium	27.0	--	--	--	34.0	2
	Magnesium	11.0	--	--	--	13.0	2
	Sodium	0.50	--	--	--	0.50	2
	Potassium	0.90	--	--	--	1.8	2
	Sodium adsorption ratio (unitless)	0.02	--	--	--	0.02	2

Appendix E–1. Summary statistics for water samples, Yellowstone Volcanic Area, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Madison aquifer (wells)— Continued	Alkalinity (as CaCO_3)	114	--	--	--	126	2
	Chloride	1.0	--	--	--	1.7	2
	Silica	5.3	--	--	--	7.2	2
	Sulfate	4.9	--	--	--	5.8	2
	Total dissolved solids	128	--	--	--	138	2
	Boron	10.0	--	--	--	10.0	2
Darby aquifer (wells)	pH (standard units)	7.3	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	328	--	--	--	--	1
	Hardness (as CaCO_3)	177	--	--	--	--	1
	Calcium	51.0	--	--	--	--	1
	Magnesium	12.0	--	--	--	--	1
	Sodium	0.80	--	--	--	--	1
	Potassium	0.40	--	--	--	--	1
	Sodium adsorption ratio (unit-less)	0.03	--	--	--	--	1
	Alkalinity (as CaCO_3)	178	--	--	--	--	1
	Chloride	2.0	--	--	--	--	1
	Fluoride	0.10	--	--	--	--	1
	Silica	6.5	--	--	--	--	1
	Sulfate	2.1	--	--	--	--	1
	Total dissolved solids	183	--	--	--	--	1
	Ammonia (as N)	0.02	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.22	--	--	--	--	1
	Nitrate (as N)	0.22	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	<0.01	--	--	--	--	1
	Phosphorus, unfiltered (as P)	<0.01	--	--	--	--	1

Appendix E-2

*Statistics for water samples,
Northern Ranges, Wyoming*

Appendix E–2. Summary statistics for water samples, Northern Ranges, Wyoming.

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary alluvial aquifers (springs)	pH (standard units)	8.2	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	285	--	--	--	--	1
	Hardness (as CaCO_3)	150	--	--	--	--	1
	Calcium	48.0	--	--	--	--	1
	Magnesium	6.7	--	--	--	--	1
	Sodium	1.1	--	--	--	--	1
	Potassium	0.50	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.04	--	--	--	--	1
	Alkalinity (as CaCO_3)	125	--	--	--	--	1
	Chloride	1.8	--	--	--	--	1
	Fluoride	0.20	--	--	--	--	1
	Silica	5.1	--	--	--	--	1
	Sulfate	20.0	--	--	--	--	1
	Total dissolved solids	159	--	--	--	--	1
Quaternary alluvial aquifers (wells)	Dissolved oxygen	1.2	--	--	--	3.8	2
	pH (standard units)	6.7	7.5	7.6	8.0	8.0	5
	Specific conductance ($\mu\text{S}/\text{cm}$)	193	257	291	353	433	5
	Hardness (as CaCO_3)	142	--	166	--	221	3
	Calcium	35.0	--	37.0	--	57.0	3
	Magnesium	12.0	--	19.0	--	19.0	3
	Sodium	2.4	--	5.5	--	6.0	3
	Potassium	1.0	--	2.0	--	5.3	3
	Sodium adsorption ratio (unitless)	0.09	--	0.18	--	0.19	3
	Alkalinity (as CaCO_3)	97.0	121	148	165	180	4
	Chloride	2.1	--	2.8	--	3.3	3
	Fluoride	0.10	--	0.40	--	0.60	3
	Silica	10.0	--	14.0	--	48.0	3
	Sulfate	7.4	--	9.1	--	75.0	3
	Total dissolved solids	160	--	233	--	267	3
	Ammonia (as N)	--	0.01	0.02	0.04	0.18	5
	Nitrate plus nitrite (as N)	--	0.08	0.10	0.13	0.92	5
	Nitrate (as N)	--	0.08	0.10	0.13	0.92	5
	Nitrite (as N)	--	--	--	--	<0.10	5
	Orthophosphate (as P)	<0.01	--	--	--	0.14	5
	Phosphorus, unfiltered (as P)	<0.01	--	--	--	--	1
	Aluminum	--	--	--	--	10.0	2
	Arsenic	<1.0	--	--	--	3.0	2
	Boron	10.0	--	--	--	30.0	2

Appendix E-2. Summary statistics for water samples, Northern Ranges, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary alluvial aquifers (wells)—Continued	Cadmium	<10.0	--	--	--	--	1
	Chromium	--	--	--	--	<1.0	2
	Copper	--	--	--	--	<1.0	2
	Iron	<3.0	--	--	--	--	1
	Lead	--	--	--	--	<1.0	2
	Manganese	<1.0	--	--	--	--	1
	Mercury	--	--	--	--	<0.01	2
	Selenium	--	--	--	--	<1.0	2
	Zinc	<3.0	--	--	--	--	1
Quaternary terrace-deposit aquifers (springs)	Hardness (as CaCO_3)	89.0	--	--	--	--	1
	Calcium	27.0	--	--	--	--	1
	Magnesium	5.3	--	--	--	--	1
	Sodium	18.0	--	--	--	--	1
	Potassium	3.4	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.80	--	--	--	--	1
	Alkalinity (as CaCO_3)	98.0	--	--	--	--	1
	Chloride	9.3	--	--	--	--	1
	Fluoride	1.4	--	--	--	--	1
	Silica	27.0	--	--	--	--	1
	Sulfate	21.0	--	--	--	--	1
	Total dissolved solids	172	--	--	--	--	1
	Ammonia plus organic nitrogen, unfiltered (as N)	0.10	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.09	--	--	--	--	1
	Total nitrogen, unfiltered (as N)	0.19	--	--	--	--	1
	Phosphorus, unfiltered (as P)	0.02	--	--	--	--	1
	Dissolved organic carbon	15.0	--	--	--	--	1
	Iron	20.0	--	--	--	--	1
Quaternary terrace-deposit aquifers (wells)	pH (standard units)	7.5	--	--	--	8.2	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	280	--	--	--	940	2
	Hardness (as CaCO_3)	37.0	--	--	--	110	2
	Calcium	13.0	--	--	--	34.0	2
	Magnesium	0.90	--	--	--	4.7	2
	Sodium	14.0	--	--	--	190	2
	Potassium	3.0	--	--	--	12.0	2
	Sodium adsorption ratio (unitless)	0.60	--	--	--	13.7	2
	Alkalinity (as CaCO_3)	119	--	--	--	258	2
	Chloride	7.4	--	--	--	110	2

Appendix E–2. Summary statistics for water samples, Northern Ranges, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary terrace-deposit aquifers (wells)—Continued	Fluoride	1.0	--	--	--	5.0	2
	Silica	27.0	--	--	--	95.0	2
	Sulfate	9.9	--	--	--	22.0	2
	Total dissolved solids	173	--	--	--	601	2
	Boron	120	--	--	--	510	2
	Iron	10.0	--	--	--	--	1
Quaternary glacial-deposit aquifers (springs)	Iron, unfiltered	70.0	--	--	--	--	1
	pH (standard units)	8.0	--	--	--	8.2	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	315	--	--	--	385	2
	Hardness (as CaCO_3)	170	--	--	--	200	2
	Calcium	49.0	--	--	--	60.0	2
	Magnesium	11.0	--	--	--	12.0	2
	Sodium	1.1	--	--	--	1.6	2
	Potassium	0.50	--	--	--	2.1	2
	Sodium adsorption ratio (unitless)	0.04	--	--	--	0.05	2
	Alkalinity (as CaCO_3)	169	--	--	--	198	2
	Chloride	0.70	--	--	--	1.5	2
	Fluoride	0.10	--	--	--	0.10	2
	Silica	6.5	--	--	--	21.0	2
	Sulfate	0.80	--	--	--	3.3	2
	Total dissolved solids	173	--	--	--	219	2
	Ammonia (as N)	0.02	--	--	--	--	1
Quaternary glacial-deposit aquifers (wells)	Nitrate plus nitrite (as N)	0.25	--	--	--	--	1
	Nitrate (as N)	0.25	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	0.02	--	--	--	--	1
	Boron	10.0	--	--	--	20.0	2
	Iron	20.0	--	--	--	--	1
	Dissolved oxygen	7.7	--	--	--	8.6	2
	pH (standard units)	7.5	7.5	7.7	7.8	8.0	6
	Specific conductance ($\mu\text{S}/\text{cm}$)	280	319	368	403	464	6

Appendix E-2. Summary statistics for water samples, Northern Ranges, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary glacial-deposit aquifers (wells)—Continued	Fluoride	0.10	0.15	0.20	0.20	0.20	4
	Silica	5.9	8.0	12.0	17.5	21.0	4
	Sulfate	0.80	1.2	2.5	4.2	4.9	4
	Total dissolved solids	162	165	178	209	228	4
	Ammonia (as N)	<0.01	--	--	--	0.03	2
	Nitrate plus nitrite (as N)	0.06	--	--	--	0.52	2
	Nitrate (as N)	0.06	--	--	--	0.52	2
	Nitrite (as N)	--	--	--	--	<0.01	2
	Orthophosphate (as P)	<0.01	--	--	--	0.02	2
	Phosphorus, unfiltered (as P)	<0.01	--	--	--	--	1
	Boron	10.0	--	20.0	--	50.0	3
	Iron	10.0	--	--	--	20.0	2
	Iron, unfiltered	10.0	--	--	--	--	1
Quaternary landslide deposits (springs)	pH (standard units)	8.2	--	--	--	8.3	2
	Calcium	20.2	--	31.5	--	72.3	3
	Magnesium	5.6	--	10.6	--	18.6	3
	Sodium	0.46	--	0.69	--	0.85	3
	Potassium	0.23	--	0.55	--	0.59	3
	Sodium adsorption ratio (unitless)	0.02	--	0.02	--	0.04	3
	Alkalinity (as CaCO_3)	90.3	--	154	--	331	3
	Chloride	0.18	--	0.39	--	5.7	3
	Fluoride	0.84	--	--	--	0.84	2
	Silica	0.71	--	1.7	--	4.1	3
	Sulfate	7.3	--	7.7	--	14.9	3
	Total dissolved solids	79.8	--	127	--	276	3
Quaternary landslide deposits (wells)	pH (standard units)	8.7	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	875	--	--	--	--	1
	Hardness (as CaCO_3)	60.0	--	--	--	--	1
	Calcium	17.0	--	--	--	--	1
	Magnesium	4.6	--	--	--	--	1
	Sodium	180	--	--	--	--	1
	Potassium	1.4	--	--	--	--	1
	Sodium adsorption ratio (unitless)	10.0	--	--	--	--	1
	Alkalinity (as CaCO_3)	290	--	--	--	--	1
	Chloride	4.2	--	--	--	--	1
	Fluoride	0.80	--	--	--	--	1
	Silica	9.9	--	--	--	--	1
	Sulfate	82.0	--	--	--	--	1
	Total dissolved solids	495	--	--	--	--	1

Appendix E-2. Summary statistics for water samples, Northern Ranges, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary landslide deposits (wells)—Continued	Boron	190	--	--	--	--	1
	Iron	20.0	--	--	--	--	1
Quaternary and Tertiary volcanic rocks (Yellowstone Group) (springs)	pH (standard units)	6.6	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	74.0	--	--	--	--	1
	Hardness (as CaCO_3)	29.5	--	--	--	--	1
	Calcium	8.7	--	--	--	--	1
	Magnesium	1.9	--	--	--	--	1
	Sodium	2.8	--	--	--	--	1
	Potassium	1.2	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.22	--	--	--	--	1
	Alkalinity (as CaCO_3)	36.0	--	--	--	--	1
	Chloride	0.10	--	--	--	--	1
	Fluoride	0.10	--	--	--	--	1
	Silica	23.0	--	--	--	--	1
	Sulfate	1.7	--	--	--	--	1
	Total dissolved solids	61.0	--	--	--	--	1
	Ammonia (as N)	<0.01	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.07	--	--	--	--	1
	Nitrate (as N)	0.07	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	0.01	--	--	--	--	1
	Phosphorus, unfiltered (as P)	0.02	--	--	--	--	1
Quaternary and Tertiary volcanic rocks (Yellowstone Group) (wells)	Dissolved oxygen	4.5	--	--	--	5.1	2
	pH (standard units)	7.9	--	--	--	8.0	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	392	--	--	--	483	2
	Alkalinity (as CaCO_3)	160	--	--	--	190	2
	Ammonia (as N)	0.02	--	--	--	0.04	2
	Nitrate plus nitrite (as N)	0.07	--	--	--	0.10	2
	Nitrate (as N)	0.07	--	--	--	0.10	2
	Nitrite (as N)	--	--	--	--	<0.01	2
	Orthophosphate (as P)	0.02	--	--	--	0.02	2
Quaternary and Tertiary volcanic rocks (Tertiary intrusive rocks) (wells)	pH (standard units)	7.8	--	--	--	7.9	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	475	--	--	--	490	2
	Hardness (as CaCO_3)	220	--	--	--	230	2
	Calcium	60.0	--	--	--	62.0	2
	Magnesium	16.0	--	--	--	19.0	2
	Sodium	9.6	--	--	--	10.0	2
	Potassium	4.4	--	--	--	4.7	2
	Sodium adsorption ratio (unitless)	0.28	--	--	--	0.29	2

Appendix E–2. Summary statistics for water samples, Northern Ranges, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary and Tertiary volcanic rocks (Tertiary intrusive rocks) (wells)—Continued	Alkalinity (as CaCO_3)	229	--	--	--	235	2
	Chloride	1.5	--	--	--	1.5	2
	Fluoride	0.20	--	--	--	0.30	2
	Silica	45.0	--	--	--	62.0	2
	Sulfate	12.0	--	--	--	13.0	2
	Total dissolved solids	296	--	--	--	306	2
Frontier aquifer (springs)	pH (standard units)	7.7	--	7.7	--	8.5	3
	Specific conductance ($\mu\text{S}/\text{cm}$)	113	--	550	--	690	3
	Hardness (as CaCO_3)	46.9	--	150	--	210	3
	Calcium	15.0	--	51.0	--	75.0	3
	Magnesium	2.3	--	4.1	--	5.7	3
	Sodium	3.9	--	68.0	--	74.0	3
	Potassium	0.40	--	1.2	--	2.1	3
	Sodium adsorption ratio (unitless)	0.25	--	2.2	--	2.5	3
	Alkalinity (as CaCO_3)	46.0	--	203	--	286	3
	Chloride	0.50	--	1.8	--	1.8	3
	Fluoride	0.20	--	0.40	--	0.40	3
	Silica	9.7	--	12.0	--	17.0	3
	Sulfate	12.0	--	73.0	--	74.0	3
	Total dissolved solids	80.0	--	338	--	416	3
	Ammonia (as N)	0.04	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.31	--	--	--	--	1
	Nitrate (as N)	0.31	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	0.02	--	--	--	--	1
	Boron	90.0	--	--	--	90.0	2
	Iron	20.0	--	--	--	--	1
Twin Creek aquifer (springs)	pH (standard units)	7.6	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	446	--	--	--	--	1
	Hardness (as CaCO_3)	240	--	--	--	--	1
	Calcium	72.0	--	--	--	--	1
	Magnesium	14.0	--	--	--	--	1
	Sodium	3.3	--	--	--	--	1
	Potassium	0.60	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.10	--	--	--	--	1
	Alkalinity (as CaCO_3)	240	--	--	--	--	1
	Chloride	1.4	--	--	--	--	1
	Fluoride	0.10	--	--	--	--	1
	Silica	12.0	--	--	--	--	1

Appendix E-2. Summary statistics for water samples, Northern Ranges, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Twin Creek aquifer (springs)— Continued	Sulfate	8.3	--	--	--	--	1
	Total dissolved solids	256	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.15	--	--	--	--	1
	Boron	10.0	--	--	--	--	1
	Iron, unfiltered	10.0	--	--	--	--	1
Gypsum Spring confining unit (springs)	Calcium	401	--	--	--	--	1
	Magnesium	98.5	--	--	--	--	1
	Sodium	106	--	--	--	--	1
	Potassium	2.7	--	--	--	--	1
	Sodium adsorption ratio (unitless)	1.2	--	--	--	--	1
	Alkalinity (as CaCO_3)	6.7	--	--	--	--	1
	Chloride	21.3	--	--	--	--	1
	Silica	7.6	--	--	--	--	1
	Sulfate	1,560	--	--	--	--	1
	Total dissolved solids	2,190	--	--	--	--	1
Chugwater aquifer and confining unit (wells)	pH (standard units)	7.7	--	--	--	8.1	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	290	--	--	--	1,700	2
	Hardness (as CaCO_3)	150	--	--	--	980	2
	Calcium	38.0	--	--	--	290	2
	Magnesium	12.0	--	--	--	63.0	2
	Sodium	1.1	--	--	--	19.0	2
	Potassium	0.50	--	--	--	2.6	2
	Sodium adsorption ratio (unitless)	0.04	--	--	--	0.26	2
	Alkalinity (as CaCO_3)	128	--	--	--	134	2
	Chloride	0.70	--	--	--	11.0	2
	Fluoride	0.20	--	--	--	0.80	2
	Silica	5.8	--	--	--	8.4	2
	Sulfate	13.0	--	--	--	880	2
	Total dissolved solids	153	--	--	--	1,340	2
Ankareh aquifer (springs)	Boron	90.0	--	--	--	--	1
	Iron	10.0	--	--	--	60.0	2
	pH (standard units)	7.1	--	--	--	--	1
Ankareh aquifer (springs)	Specific conductance ($\mu\text{S}/\text{cm}$)	446	--	--	--	--	1
	Hardness (as CaCO_3)	235	--	--	--	--	1
	Calcium	71.0	--	--	--	--	1
	Magnesium	14.0	--	--	--	--	1
	Sodium	3.2	--	--	--	--	1
	Potassium	0.70	--	--	--	--	1

Appendix E-2. Summary statistics for water samples, Northern Ranges, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Ankareh aquifer (springs)— Continued	Sodium adsorption ratio (unitless)	0.09	--	--	--	--	1
	Alkalinity (as CaCO_3)	243	--	--	--	--	1
	Chloride	2.1	--	--	--	--	1
	Fluoride	0.10	--	--	--	--	1
	Silica	12.0	--	--	--	--	1
	Sulfate	7.1	--	--	--	--	1
	Total dissolved solids	256	--	--	--	--	1
	Ammonia (as N)	<0.01	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.15	--	--	--	--	1
	Nitrate (as N)	0.15	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	<0.01	--	--	--	--	1
	Phosphorus, unfiltered (as P)	0.01	--	--	--	--	1
Dinwoody aquifer and confining unit (springs)	pH (standard units)	7.3	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	455	--	--	--	--	1
	Hardness (as CaCO_3)	251	--	--	--	--	1
	Calcium	66.0	--	--	--	--	1
	Magnesium	21.0	--	--	--	--	1
	Sodium	3.0	--	--	--	--	1
	Potassium	0.60	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.08	--	--	--	--	1
	Alkalinity (as CaCO_3)	253	--	--	--	--	1
	Chloride	2.1	--	--	--	--	1
	Fluoride	0.10	--	--	--	--	1
	Silica	13.0	--	--	--	--	1
	Sulfate	4.3	--	--	--	--	1
	Total dissolved solids	262	--	--	--	--	1
	Ammonia (as N)	<0.01	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.08	--	--	--	--	1
	Nitrate (as N)	0.08	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	0.05	--	--	--	--	1
	Phosphorus, unfiltered (as P)	0.04	--	--	--	--	1
Phosphoria aquifer (springs)	pH (standard units)	7.8	--	7.8	--	8.0	3
	Calcium	27.7	--	31.1	--	43.5	3
	Magnesium	7.4	--	9.7	--	12.2	3
	Sodium	0.18	--	0.69	--	1.8	3
	Potassium	0.08	--	0.08	--	0.08	3

Appendix E-2. Summary statistics for water samples, Northern Ranges, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Phosphoria aquifer (springs)—Continued	Sodium adsorption ratio (unitless)	0.008	--	0.02	--	0.07	3
	Alkalinity (as CaCO_3)	103	--	116	--	132	3
	Chloride	0.07	--	0.07	--	1.1	3
	Fluoride	0.84	--	0.84	--	0.84	3
	Silica	0.88	--	1.4	--	1.7	3
	Sulfate	3.4	--	25.0	--	42.3	3
	Total dissolved solids	95.4	--	119	--	164	3
Tensleep aquifer (springs)	pH (standard units)	7.3	7.5	7.6	7.8	8.0	6
	Specific conductance ($\mu\text{S}/\text{cm}$)	219	--	438	--	518	3
	Hardness (as CaCO_3)	109	--	242	--	275	3
	Calcium	27.0	53.9	65.6	69.0	76.0	6
	Magnesium	10.0	17.0	18.8	24.4	28.0	6
	Sodium	0.23	0.23	1.2	1.6	5.9	6
	Potassium	0.08	0.08	0.44	1.4	1.7	6
	Sodium adsorption ratio (unitless)	0.006	0.007	0.03	0.07	0.15	6
	Alkalinity (as CaCO_3)	116	132	177	227	284	6
	Chloride	0.10	0.20	0.71	1.4	4.7	6
	Fluoride	0.10	0.20	0.52	0.84	0.84	6
	Silica	1.6	3.0	5.6	11.0	26.0	6
	Sulfate	1.5	2.2	39.1	122	140	6
	Total dissolved solids	123	233	268	300	312	6
	Ammonia (as N)	<0.01	--	--	--	0.02	3
	Nitrate plus nitrite (as N)	0.05	--	0.22	--	0.29	3
	Nitrate (as N)	0.05	--	0.22	--	0.29	3
	Nitrite (as N)	--	--	--	--	<0.01	3
	Orthophosphate (as P)	0.01	--	0.02	--	0.17	3
	Phosphorus, unfiltered (as P)	0.03	--	--	--	0.26	2
	Aluminum	20.0	--	--	--	--	1
	Arsenic	4.0	--	--	--	--	1
	Boron	20.0	--	--	--	--	1
	Cadmium	<10.0	--	--	--	--	1
	Chromium	<1.0	--	--	--	--	1
	Copper	2.0	--	--	--	--	1
	Iron	<3.0	--	--	--	--	1
	Lead	<1.0	--	--	--	--	1
	Manganese	<1.0	--	--	--	--	1
	Mercury	<0.10	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
	Zinc	<3.0	--	--	--	--	1

Appendix E-2. Summary statistics for water samples, Northern Ranges, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Amsden aquifer (springs)	Calcium	16.6	--	--	--	--	1
	Magnesium	3.2	--	--	--	--	1
	Sodium	0.18	--	--	--	--	1
	Potassium	0.08	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.01	--	--	--	--	1
	Alkalinity (as CaCO_3)	68.9	--	--	--	--	1
	Chloride	0.11	--	--	--	--	1
	Silica	0.37	--	--	--	--	1
	Sulfate	2.1	--	--	--	--	1
	Total dissolved solids	56.3	--	--	--	--	1
Madison aquifer (springs and cave)	pH (standard units)	7.5	7.5	7.7	7.9	8.0	4
	Specific conductance ($\mu\text{S}/\text{cm}$)	156	--	--	--	--	1
	Hardness (as CaCO_3)	81.3	--	--	--	--	1
	Calcium	9.2	22.0	26.5	27.9	28.1	6
	Magnesium	1.2	5.1	6.9	7.4	8.9	6
	Sodium	0.18	0.18	0.23	0.60	0.76	6
	Potassium	0.08	0.08	0.12	0.20	0.43	6
	Sodium adsorption ratio (unitless)	0.008	0.008	0.02	0.03	0.03	6
	Alkalinity (as CaCO_3)	35.4	82.0	109	118	120	6
	Chloride	0.07	0.07	0.09	0.18	0.35	6
	Fluoride	0.20	0.52	0.84	0.84	0.84	4
	Silica	0.60	0.62	1.2	2.3	2.3	6
	Sulfate	0.48	1.3	1.8	4.3	13.0	6
	Total dissolved solids	31.5	82.8	89.0	101	106	6
	Ammonia (as N)	<0.01	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.19	--	--	--	--	1
	Nitrate (as N)	0.19	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	<0.01	--	--	--	--	1
	Phosphorus, unfiltered (as P)	<0.01	--	--	--	--	1
Bighorn aquifer (springs)	pH (standard units)	7.3	--	8.0	--	8.2	3
	Specific conductance ($\mu\text{S}/\text{cm}$)	179	--	--	--	202	2
	Hardness (as CaCO_3)	99.9	--	--	--	105	2
	Calcium	11.8	--	26.0	--	28.0	3
	Magnesium	2.4	--	8.4	--	8.5	3
	Sodium	0.18	--	0.50	--	0.60	3
	Potassium	0.08	--	0.30	--	0.40	3
	Sodium adsorption ratio (unitless)	0.01	--	0.02	--	0.03	3

Appendix E-2. Summary statistics for water samples, Northern Ranges, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Bighorn aquifer (springs)— Continued	Alkalinity (as CaCO_3)	46.4	--	92.0	--	107	3
	Chloride	0.07	--	0.10	--	0.10	3
	Fluoride	0.20	--	0.30	--	0.84	3
	Silica	0.28	--	2.8	--	3.9	3
	Sulfate	0.48	--	1.1	--	2.4	3
	Total dissolved solids	37.1	--	96.0	--	107	3
	Ammonia (as N)	<0.01	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.16	--	--	--	--	1
	Nitrate (as N)	0.16	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	<0.01	--	--	--	--	1
	Phosphorus, unfiltered (as P)	<0.01	--	--	--	0.01	2
	Aluminum	<10.0	--	--	--	--	1
	Arsenic	<1.0	--	--	--	--	1
	Boron	<10.0	--	--	--	--	1
	Chromium	<1.0	--	--	--	--	1
	Copper	2.0	--	--	--	--	1
	Lead	<1.0	--	--	--	--	1
	Mercury	<0.10	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
Bighorn aquifer (wells)	pH (standard units)	7.7	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	440	--	--	--	--	1
	Hardness (as CaCO_3)	4.0	--	--	--	--	1
	Calcium	1.7	--	--	--	--	1
	Sodium	109	--	--	--	--	1
	Potassium	0.20	--	--	--	--	1
	Sodium adsorption ratio (unitless)	23.0	--	--	--	--	1
	Alkalinity (as CaCO_3)	226	--	--	--	--	1
	Chloride	1.0	--	--	--	--	1
	Fluoride	0.20	--	--	--	--	1
	Silica	19.0	--	--	--	--	1
	Sulfate	4.1	--	--	--	--	1
	Total dissolved solids	270	--	--	--	--	1
	Boron	20.0	--	--	--	--	1
	Iron, unfiltered	30.0	--	--	--	--	1
Gallatin aquifer and confining unit (springs)	pH (standard units)	7.6	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	2,380	--	--	--	--	1
	Hardness (as CaCO_3)	1,600	--	--	--	--	1
	Calcium	20.6	--	--	--	430	2

Appendix E-2. Summary statistics for water samples, Northern Ranges, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Gallatin aquifer and confining unit (springs)—Continued	Magnesium	5.4	--	--	--	120	2
	Sodium	0.25	--	--	--	28.0	2
	Potassium	0.23	--	--	--	13.0	2
	Sodium adsorption ratio (unitless)	0.01	--	--	--	0.31	2
	Alkalinity (as CaCO_3)	92.7	--	--	--	160	2
	Chloride	0.11	--	--	--	3.9	2
	Fluoride	0.50	--	--	--	--	1
	Silica	0.05	--	--	--	26.0	2
Gros Ventre aquifer and confining unit (springs)	Sulfate	3.6	--	--	--	1,600	2
	Total dissolved solids	75.8	--	--	--	2,480	2
	Boron	60.0	--	--	--	--	1
	pH (standard units)	7.2	7.5	7.8	8.0	8.1	4
	Specific conductance ($\mu\text{S}/\text{cm}$)	186	--	--	--	260	2
	Hardness (as CaCO_3)	88.8	--	--	--	135	2
	Calcium	24.0	27.5	28.7	34.5	36.0	5
	Magnesium	4.9	7.0	10.7	11.0	14.5	5
Flathead aquifer (hot springs)	Sodium	0.18	0.18	0.44	0.60	2.0	5
	Potassium	0.08	0.30	0.35	0.39	0.70	5
	Sodium adsorption ratio (unitless)	0.007	0.008	0.02	0.02	0.09	5
	Alkalinity (as CaCO_3)	94.0	98.2	137	139	188	5
	Chloride	0.07	0.07	0.39	1.1	2.1	5
	Fluoride	0.10	0.10	0.47	0.84	0.84	4
	Silica	0.78	0.83	1.8	2.8	7.8	5
	Sulfate	0.48	2.1	3.3	3.5	5.8	5
Flathead aquifer (hot springs)	Total dissolved solids	86.8	102	107	140	148	5
	Ammonia (as N)	<0.01	--	--	--	0.02	2
	Nitrate plus nitrite (as N)	0.12	--	--	--	0.15	2
	Nitrate (as N)	0.12	--	--	--	0.15	2
	Nitrite (as N)	--	--	--	--	<0.01	2
	Orthophosphate (as P)	<0.01	--	--	--	0.01	2
	Phosphorus, unfiltered (as P)	<0.01	--	--	--	--	1
	Boron	30.0	--	--	--	--	1
Flathead aquifer (hot springs)	Iron	30.0	--	--	--	--	1
	pH (standard units)	8.3	--	--	--	8.3	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	1,050	--	--	--	--	1
	Hardness (as CaCO_3)	110	--	--	--	--	1
	Calcium	24.7	--	--	--	32.0	2
	Magnesium	2.5	--	--	--	6.4	2
	Sodium	180	--	--	--	266	2

Appendix E-2. Summary statistics for water samples, Northern Ranges, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Flathead aquifer (hot springs)— Continued	Potassium	8.8	--	--	--	17.1	2
	Sodium adsorption ratio (unitless)	7.6	--	--	--	13.6	2
	Alkalinity (as CaCO_3)	191	--	--	--	200	2
	Chloride	140	--	--	--	234	2
	Fluoride	6.0	--	--	--	6.8	2
	Silica	39.4	--	--	--	49.0	2
	Sulfate	150	--	--	--	180	2
	Total dissolved solids	670	--	--	--	826	2
	Arsenic	<50.0	--	--	--	--	1
	Barium	<500	--	--	--	--	1
	Boron	610	--	--	--	--	1
	Cadmium	<10.0	--	--	--	--	1
	Chromium	<100	--	--	--	--	1
	Copper	<10.0	--	--	--	--	1
	Lead	<100	--	--	--	--	1
	Manganese	<50.0	--	--	--	--	1
	Mercury	<1.0	--	--	--	--	1
	Nickel	<100	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
	Zinc	<20.0	--	--	--	--	1
Precambrian basal confining unit (springs)	pH (standard units)	6.4	6.5	6.8	7.2	7.4	4
	Specific conductance ($\mu\text{S}/\text{cm}$)	17.0	75.0	174	797	1,380	4
	Hardness (as CaCO_3)	4.8	34.9	87.5	304	498	4
	Calcium	1.5	8.2	18.6	30.0	160	7
	Magnesium	0.25	0.73	2.3	8.6	24.0	7
	Sodium	0.80	1.2	1.4	2.9	91.0	7
	Potassium	0.30	0.39	0.86	0.98	25.0	7
	Sodium adsorption ratio (unitless)	0.05	0.07	0.10	0.28	1.8	7
	Alkalinity (as CaCO_3)	8.0	25.0	63.5	113	622	7
	Chloride	0.10	0.10	0.21	0.35	100	6
	Fluoride	0.10	0.10	0.10	0.15	0.20	4
	Silica	2.1	2.7	9.5	14.0	39.0	7
	Sulfate	0.80	1.6	6.8	15.8	17.0	7
	Total dissolved solids	19.0	32.8	67.7	126	829	7
	Ammonia (as N)	<0.01	--	--	--	0.08	3
	Nitrate plus nitrite (as N)	<0.05	--	--	--	0.13	3
	Nitrate (as N)	<0.05	--	--	--	0.13	3
	Nitrite (as N)	--	--	--	--	<0.01	3

Appendix E-2. Summary statistics for water samples, Northern Ranges, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Precambrian basal confining unit (springs)—Continued	Orthophosphate (as P)	--	--	--	--	<0.01	3
	Phosphorus, unfiltered (as P)	<0.01	--	--	--	0.02	2
	Aluminum	<10.0	--	--	--	--	1
	Arsenic	<1.0	--	--	--	--	1
	Boron	10.0	--	--	--	20.0	2
	Chromium	<1.0	--	--	--	--	1
	Copper	<1.0	--	--	--	--	1
	Lead	<1.0	--	--	--	--	1
	Mercury	<0.10	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1

Appendix E-3

*Statistics for water samples,
Jackson Hole, Wyoming*

Appendix E-3. Summary statistics for water samples, Jackson Hole, Wyoming.

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary alluvial aquifers (springs)	Dissolved oxygen	6.3	--	--	--	--	1
	pH (standard units)	7.3	--	--	--	7.5	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	237	--	--	--	724	2
	Hardness (as CaCO_3)	344	--	--	--	--	1
	Calcium	100	--	--	--	--	1
	Magnesium	23.0	--	--	--	--	1
	Sodium	27.0	--	--	--	--	1
	Potassium	2.0	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.63	--	--	--	--	1
	Alkalinity (as CaCO_3)	279	--	--	--	--	1
	Chloride	2.6	--	--	--	4.7	2
	Fluoride	0.20	--	--	--	--	1
	Silica	15.0	--	--	--	--	1
	Sulfate	130	--	--	--	--	1
	Total dissolved solids	470	--	--	--	--	1
	Ammonia (as N)	--	--	--	--	<0.01	2
	Nitrate plus nitrite (as N)	0.08	--	--	--	0.34	2
	Nitrate (as N)	0.08	--	--	--	0.34	2
	Nitrite (as N)	--	--	--	--	<0.01	2
	Orthophosphate (as P)	<0.01	--	--	--	0.01	2
	Phosphorus, unfiltered (as P)	<0.01	--	--	--	--	1
Quaternary alluvial aquifers (wells)	Dissolved oxygen	0.10	3.1	5.2	7.0	9.2	39
	pH (standard units)	6.0	7.5	7.7	7.9	8.8	97
	Specific conductance ($\mu\text{S}/\text{cm}$)	34.0	273	401	467	892	94
	Hardness (as CaCO_3)	10.0	130	187	230	422	68
	Calcium	2.1	37.5	54.5	66.0	126	68
	Magnesium	1.2	8.0	12.5	19.0	49.6	68
	Sodium	1.0	4.2	6.3	8.4	150	71
	Potassium	0.50	1.3	1.6	2.3	9.0	68
	Sodium adsorption ratio (unitless)	0.02	0.12	0.20	0.28	20.5	68
	Alkalinity (as CaCO_3)	12.0	132	174	211	353	79
	Chloride	0.30	1.8	2.8	4.2	34.0	81
	Fluoride	0.03	0.11	0.20	0.30	3.6	71
	Silica	6.5	10.0	13.0	16.0	51.0	62
	Sulfate	1.5	8.0	21.3	48.5	271	72
	Total dissolved solids	52.0	161	250	277	628	71
	Ammonia (as N)	--	0.005	0.009	0.02	0.04	54
	Ammonia plus organic nitrogen, unfiltered (as N)	0.10	--	--	--	0.27	2

Appendix E-3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary alluvial aquifers (wells)—Continued	Nitrate plus nitrite (as N)	--	0.08	0.17	0.36	2.9	64
	Nitrate (as N)	--	0.08	0.16	0.31	2.4	56
	Nitrite (as N)	--	--	--	--	<0.10	57
	Organic nitrogen, unfiltered (as N)	0.14	--	0.15	--	0.26	3
	Total nitrogen, unfiltered (as N)	0.25	--	--	--	0.36	2
	Orthophosphate (as P)	--	0.006	0.01	0.02	0.13	53
	Phosphorus (as P)	--	0.008	0.02	0.03	0.06	16
	Phosphorus, unfiltered (as P)	--	0.01	0.02	0.03	0.06	10
	Dissolved organic carbon	--	0.30	0.40	0.60	1.9	15
	Aluminum	--	1.8	5.1	14.0	260	14
	Antimony	--	--	--	--	<1.0	3
	Arsenic	--	0.77	1.3	2.1	4.0	25
	Barium	--	35.6	63.1	112	300	15
	Beryllium	--	--	--	--	<5.0	3
	Boron	--	19.5	31.5	51.0	160	42
	Cadmium	--	--	--	--	<10.0	24
	Chromium	--	--	--	--	<50.0	24
	Cobalt	<3.0	--	--	--	4.0	2
	Copper	--	0.74	2.4	7.9	80.0	26
	Iron	--	1.5	7.3	36.2	2,000	44
	Iron, unfiltered	--	35.0	45.0	235	740	8
	Lead	--	--	--	--	<50.0	23
	Lithium	12.0	--	--	--	--	1
	Manganese	--	0.10	0.68	4.8	130	31
	Mercury	--	--	--	--	<1.0	26
	Molybdenum	--	--	--	--	<100	2
	Nickel	--	--	--	--	<50.0	6
	Selenium	--	--	--	--	<10.0	28
	Strontium	150	--	--	--	--	1
	Vanadium	--	--	--	--	<100	2
	Zinc	--	11.0	26.0	53.0	1,500	23
	Gross alpha radioactivity (picocuries per liter)	--	1.0	1.5	3.3	4.6	4
	Gross beta radioactivity (picocuries per liter)	<1.0	--	4.2	--	8.0	3
	Radium-226 (picocuries per liter)	<0.20	--	--	--	0.20	2
	Radium-228 (picocuries per liter)	<1.0	--	--	--	--	1

Appendix E-3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary alluvial aquifers (wells)—Continued	Radon-222, unfiltered (picocuries per liter)	540	620	740	1,000	1,500	11
	Uranium	1.0	--	--	--	35	2
Quaternary terrace-deposit aquifers (springs)	pH (standard units)	7.8	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	286	--	--	--	--	1
	Hardness (as CaCO_3)	139	--	--	--	--	1
	Calcium	43.0	--	--	--	--	1
	Magnesium	7.6	--	--	--	--	1
	Sodium	6.9	--	--	--	--	1
	Potassium	1.3	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.25	--	--	--	--	1
	Alkalinity (as CaCO_3)	150	--	--	--	--	1
	Chloride	0.40	--	--	--	--	1
	Fluoride	0.10	--	--	--	--	1
	Silica	18.0	--	--	--	--	1
	Sulfate	5.0	--	--	--	--	1
	Total dissolved solids	173	--	--	--	--	1
	Ammonia (as N)	0.02	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.16	--	--	--	--	1
	Nitrate (as N)	0.16	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	0.02	--	--	--	--	1
	Aluminum	<10.0	--	--	--	--	1
	Arsenic	<1.0	--	--	--	--	1
	Boron	10.0	--	--	--	--	1
	Cadmium	10.0	--	--	--	--	1
	Chromium	<1.0	--	--	--	--	1
	Copper	<1.0	--	--	--	--	1
	Iron	<3.0	--	--	--	--	1
	Lead	<1.0	--	--	--	--	1
	Manganese	<1.0	--	--	--	--	1
	Mercury	<0.10	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
	Zinc	3.0	--	--	--	--	1
Quaternary terrace-deposit aquifers (wells)	Dissolved oxygen	0.10	0.20	2.3	6.8	8.1	14
	pH (standard units)	7.1	7.3	7.8	8.0	8.6	22
	Specific conductance ($\mu\text{S}/\text{cm}$)	114	253	286	386	493	22
	Hardness (as CaCO_3)	14.6	112	121	181	254	20
	Calcium	4.7	33.6	35.5	54.5	79.9	20
	Magnesium	0.69	6.4	8.0	10.5	13.1	20

Appendix E-3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary terrace-deposit aquifers (wells)—Continued	Sodium	2.1	6.1	7.2	8.2	94.0	20
	Potassium	0.60	1.9	2.0	2.3	2.5	20
	Sodium adsorption ratio (unitless)	0.12	0.24	0.25	0.28	10.7	20
	Alkalinity (as CaCO_3)	56.6	113	131	204	263	21
	Chloride	0.30	2.6	3.7	4.6	8.4	20
	Fluoride	0.10	0.33	0.39	0.40	0.50	18
	Silica	11.0	17.7	18.6	19.6	25.0	20
	Sulfate	2.0	6.1	8.5	11.2	42.0	20
	Total dissolved solids	58.0	154	178	235	267	20
	Ammonia (as N)	--	0.002	0.006	0.01	0.08	15
	Nitrate plus nitrite (as N)	--	0.03	0.14	0.64	1.4	16
	Nitrate (as N)	--	0.02	0.14	0.63	1.3	16
	Nitrite (as N)	--	0.0002	0.0006	0.002	0.006	15
	Organic nitrogen, unfiltered (as N)	--	--	--	--	<0.13	11
	Orthophosphate (as P)	--	0.01	0.02	0.02	0.03	15
	Phosphorus (as P)	0.02	--	--	--	--	1
	Phosphorus, unfiltered (as P)	--	0.01	0.01	0.02	0.03	11
	Dissolved organic carbon	--	0.30	0.50	0.70	0.70	11
	Boron	--	12.9	17.5	30.0	50.0	5
	Iron	--	1.9	8.5	135	592	16
	Manganese	--	0.13	21.3	967	1,690	13
	Radon-222, unfiltered (picocuries per liter)	700	--	--	--	--	1
Quaternary glacial-deposit aquifers (springs)	pH (standard units)	7.4	7.5	7.7	8.0	8.2	4
	Specific conductance ($\mu\text{S}/\text{cm}$)	125	203	384	488	489	4
	Hardness (as CaCO_3)	61.0	106	196	243	245	4
	Calcium	20.0	29.5	51.5	67.4	70.8	4
	Magnesium	2.8	7.9	14.3	18.3	21.0	4
	Sodium	1.6	1.9	5.0	9.8	11.8	4
	Potassium	0.90	--	1.4	--	4.4	3
	Sodium adsorption ratio (unitless)	0.07	0.09	0.16	0.27	0.33	4
	Alkalinity (as CaCO_3)	63.0	104	194	261	278	4
	Chloride	0.10	1.3	4.0	5.8	6.1	4
	Fluoride	0.10	--	0.20	--	0.40	3
	Silica	11.0	--	14.0	--	39.0	3
	Sulfate	1.6	2.5	4.1	9.0	13.0	4
	Total dissolved solids	78.0	123	232	304	312	4
	Nitrate plus nitrite (as N)	1.3	--	--	--	--	1

Appendix E-3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary glacial-deposit aquifers (springs)—Continued	Boron	<20.0	--	--	--	--	1
	Iron	--	--	--	--	<60.0	2
Quaternary glacial-deposit aquifers (wells)	Dissolved oxygen	0.20	3.7	6.9	8.5	10.8	10
	pH (standard units)	6.2	7.0	7.6	7.9	8.5	37
	Specific conductance ($\mu\text{S}/\text{cm}$)	32.0	134	225	470	627	37
	Hardness (as CaCO_3)	13.0	81.0	145	240	280	30
	Calcium	4.4	24.0	39.0	66.0	80.0	30
	Magnesium	0.50	4.3	9.9	17.0	25.0	30
	Sodium	0.90	3.5	5.9	14.0	52.6	30
	Potassium	0.60	1.3	2.5	3.1	6.2	30
	Sodium adsorption ratio (unitless)	0.01	0.15	0.20	0.48	1.7	30
	Alkalinity (as CaCO_3)	13.9	54.0	111	214	318	37
	Chloride	0.10	0.85	1.8	2.8	38.0	28
	Fluoride	0.10	0.17	0.20	0.40	0.80	25
	Silica	3.9	12.0	20.0	32.0	48.0	27
	Sulfate	0.40	1.9	5.7	12.0	90.0	30
	Total dissolved solids	18.0	128	176	301	378	30
	Ammonia (as N)	--	0.003	0.01	0.04	1.4	15
	Nitrate plus nitrite (as N)	--	0.06	0.10	0.18	0.71	21
	Nitrate (as N)	--	0.05	0.12	0.20	0.71	15
	Nitrite (as N)	--	--	--	--	<0.10	16
	Orthophosphate (as P)	--	0.004	0.01	0.03	0.19	15
	Phosphorus (as P)	0.01	--	0.01	--	0.03	3
	Dissolved organic carbon	0.20	--	--	--	0.60	2
	Aluminum	<10.0	--	--	--	--	1
	Antimony	<1.0	--	--	--	--	1
	Arsenic	<1.0	--	--	--	2.0	2
	Barium	<100	--	--	--	--	1
	Beryllium	<1.0	--	--	--	--	1
	Boron	--	16.3	30.2	56.1	350	17
	Cadmium	--	--	--	--	<10.0	3
	Chromium	--	--	--	--	<50.0	2
	Copper	--	--	--	--	<10.0	2
	Iron	--	10.0	30.0	115	360	16
	Iron, unfiltered	--	30.0	40.0	160	1,480	13
	Lead	--	--	--	--	<10.0	2
	Manganese	--	1.4	10.0	63.0	520	7
	Mercury	--	--	--	--	<0.20	2
	Nickel	<20.0	--	--	--	--	1

Appendix E-3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary glacial-deposit aquifers (wells)—Continued	Selenium	--	--	--	--	<1.0	2
	Zinc	<10.0	--	--	--	1,250	3
	Gross alpha radioactivity (picocuries per liter)	1.0	--	--	--	--	1
	Gross beta radioactivity (picocuries per liter)	<1.0	--	--	--	--	1
	Radium-226 (picocuries per liter)	<0.20	--	--	--	--	1
	Radium-228 (picocuries per liter)	<1.0	--	--	--	--	1
	Radon-222, unfiltered (picocuries per liter)	230	--	--	--	7,200	2
	Uranium	<0.30	--	--	--	--	1
Quaternary landslide deposits (springs)	pH (standard units)	7.4	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	311	--	--	--	--	1
	Hardness (as CaCO_3)	169	--	--	--	--	1
	Calcium	48.0	--	--	--	--	1
	Magnesium	12.0	--	--	--	--	1
	Sodium	2.3	--	--	--	--	1
	Potassium	1.2	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.08	--	--	--	--	1
	Alkalinity (as CaCO_3)	153	--	--	--	--	1
	Chloride	2.1	--	--	--	--	1
	Fluoride	0.10	--	--	--	--	1
	Silica	7.5	--	--	--	--	1
	Sulfate	14.0	--	--	--	--	1
	Total dissolved solids	179	--	--	--	--	1
	Ammonia (as N)	<0.01	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.11	--	--	--	--	1
	Nitrate (as N)	0.11	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	<0.01	--	--	--	--	1
	Phosphorus, unfiltered (as P)	<0.01	--	--	--	--	1
	Boron	10.0	--	--	--	--	1
Quaternary loess and lithified talus deposits (wells)	pH (standard units)	7.7	7.9	8.1	8.2	8.2	4
	Specific conductance ($\mu\text{S}/\text{cm}$)	215	245	279	483	682	4
	Hardness (as CaCO_3)	110	124	139	245	349	4
	Calcium	34.0	34.5	37.0	60.5	82.0	4
	Magnesium	2.5	7.3	12.5	24.0	35.0	4
	Sodium	1.1	1.8	2.6	4.6	6.4	4
	Potassium	1.4	1.9	2.4	4.6	6.6	4

Appendix E–3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary loess and lithified talus deposits (wells)—Continued	Sodium adsorption ratio (unitless)	0.05	0.07	0.09	0.12	0.15	4
	Alkalinity (as CaCO_3)	111	127	144	172	199	4
	Chloride	1.8	--	2.8	--	6.3	3
	Fluoride	0.10	0.15	0.20	0.55	0.90	4
	Silica	17.0	19.0	21.0	31.5	42.0	4
	Sulfate	3.3	--	4.2	--	170	3
	Total dissolved solids	130	146	165	319	469	4
	Ammonia (as N)	0.02	--	--	--	0.15	2
	Nitrate plus nitrite (as N)	0.05	--	--	--	0.14	2
	Nitrate (as N)	0.05	--	--	--	0.14	2
	Nitrite (as N)	0.01	--	--	--	0.01	2
	Orthophosphate (as P)	0.01	--	--	--	0.02	2
	Aluminum	10.0	--	--	--	--	1
	Arsenic	2.0	--	--	--	--	1
	Boron	<10.0	--	10.0	--	70.0	3
	Cadmium	<10.0	--	--	--	--	1
	Chromium	<1.0	--	--	--	--	1
	Copper	<1.0	--	--	--	--	1
	Iron	63.0	--	--	--	--	1
	Lead	<1.0	--	--	--	--	1
	Manganese	<1.0	--	--	--	--	1
	Mercury	<0.10	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
	Zinc	14.0	--	--	--	--	1
Quaternary and Tertiary volcanic rocks (Tertiary intrusive rocks) (wells)	pH (standard units)	7.5	--	--	--	7.7	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	472	--	--	--	490	2
	Hardness (as CaCO_3)	228	--	--	--	250	2
	Calcium	60.0	--	--	--	68.0	2
	Magnesium	18.0	--	--	--	19.0	2
	Sodium	9.1	--	--	--	9.5	2
	Potassium	1.9	--	--	--	3.0	2
	Sodium adsorption ratio (unitless)	0.25	--	--	--	0.27	2
	Alkalinity (as CaCO_3)	207	--	--	--	240	2
	Chloride	5.3	--	--	--	13.0	2
	Fluoride	0.30	--	--	--	0.30	2
	Silica	22.0	--	--	--	25.0	2
	Sulfate	9.9	--	--	--	24.0	2
	Total dissolved solids	275	--	--	--	288	2
	Ammonia (as N)	0.03	--	--	--	--	1

Appendix E-3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary and Tertiary volcanic rocks (Tertiary intrusive rocks) (wells)—Continued	Nitrate plus nitrite (as N)	<0.05	--	--	--	--	1
	Nitrate (as N)	<0.05	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	0.12	--	--	--	--	1
	Phosphorus (as P)	0.14	--	--	--	--	1
	Dissolved organic carbon	1.0	--	--	--	--	1
	Boron	60.0	--	--	--	--	1
	Iron	71.0	--	--	--	--	1
	Manganese	540	--	--	--	--	1
	Radon-222, unfiltered (picocuries per liter)	690	--	--	--	--	1
Miocene gravel deposits (wells)	pH (standard units)	7.3	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	146	--	--	--	--	1
	Hardness (as CaCO_3)	57.0	--	--	--	--	1
	Calcium	19.0	--	--	--	--	1
	Magnesium	2.5	--	--	--	--	1
	Sodium	5.9	--	--	--	--	1
	Potassium	1.9	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.30	--	--	--	--	1
	Alkalinity (as CaCO_3)	63.0	--	--	--	--	1
	Chloride	1.0	--	--	--	--	1
	Fluoride	0.30	--	--	--	--	1
	Silica	29.0	--	--	--	--	1
	Sulfate	3.3	--	--	--	--	1
	Total dissolved solids	102	--	--	--	--	1
	Nitrate (as N)	0.16	--	--	--	--	1
Camp Davis aquifer (springs)	Boron	<20.0	--	--	--	--	1
	Iron	<10.0	--	--	--	--	1
	pH (standard units)	7.4	--	7.7	--	8.0	3
	Specific conductance ($\mu\text{S}/\text{cm}$)	412	--	521	--	529	3
	Hardness (as CaCO_3)	199	--	--	--	--	1
	Calcium	53.0	--	66.0	--	71.0	3
	Magnesium	16.0	--	18.0	--	18.0	3
	Sodium	8.0	--	9.0	--	12.0	3
	Potassium	1.0	--	1.0	--	3.3	3
	Sodium adsorption ratio (unitless)	0.28	--	0.34	--	3.7	3
Yellowstone River (wells)	Alkalinity (as CaCO_3)	197	--	233	--	246	3
	Chloride	3.8	--	5.5	--	12.8	3
	Fluoride	0.16	--	0.21	--	0.30	3

Appendix E-3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Camp Davis aquifer (springs)—Continued	Silica	19.9	--	32.0	--	32.1	3
	Sulfate	4.9	--	13.0	--	14.7	3
	Total dissolved solids	252	--	288	--	292	3
	Ammonia (as N)	0.05	--	--	--	0.05	2
	Nitrate (as N)	1.1	--	--	--	1.6	2
	Nitrite (as N)	--	--	--	--	0.01	2
	Aluminum	<100	--	--	--	120	2
	Arsenic	<1.0	--	--	--	4.0	2
	Barium	180	--	--	--	230	2
	Boron	--	--	--	--	<100	3
	Cadmium	--	--	--	--	<10.0	2
	Chromium	--	--	--	--	<50.0	2
	Copper	--	--	--	--	<10.0	2
	Iron	<50.0	--	--	--	110	2
	Iron, unfiltered	30.0	--	--	--	--	1
	Lead	--	--	--	--	<50.0	2
	Manganese	<10.0	--	--	--	30.0	2
	Mercury	--	--	--	--	<1.0	2
	Molybdenum	--	--	--	--	<100	2
	Nickel	--	--	--	--	<50.0	2
	Selenium	--	--	--	--	<1.0	2
	Vanadium	--	--	--	--	<100	2
	Zinc	10.0	--	--	--	10.0	2
Camp Davis aquifer (wells)	Gross alpha radioactivity (picocuries per liter)	<1.0	--	--	--	--	1
	Radium-226 (picocuries per liter)	0.70	--	--	--	--	1
	pH (standard units)	8.7	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	312	--	--	--	--	1
	Calcium	5.0	--	--	--	--	1
	Magnesium	1.0	--	--	--	--	1
	Sodium	62.0	--	--	--	--	1
	Potassium	1.0	--	--	--	--	1
	Sodium adsorption ratio (unitless)	7.6	--	--	--	--	1
	Alkalinity (as CaCO_3)	113	--	--	--	--	1

Appendix E-3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Camp Davis aquifer (wells)—Continued	Ammonia (as N)	0.05	--	--	--	--	1
	Nitrate (as N)	0.40	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Aluminum	<100	--	--	--	--	1
	Arsenic	10.0	--	--	--	--	1
	Barium	<100	--	--	--	--	1
	Boron	<100	--	--	--	--	1
	Cadmium	<10.0	--	--	--	--	1
	Chromium	<50.0	--	--	--	--	1
	Copper	<10.0	--	--	--	--	1
	Iron	180	--	--	--	--	1
	Lead	<50.0	--	--	--	--	1
	Manganese	30.0	--	--	--	--	1
	Mercury	<1.0	--	--	--	--	1
	Molybdenum	<100	--	--	--	--	1
	Nickel	<50.0	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
	Vanadium	<100	--	--	--	--	1
	Zinc	80.0	--	--	--	--	1
Teevinot aquifer (springs)	pH (standard units)	7.3	--	7.5	--	7.8	3
	Specific conductance ($\mu\text{S}/\text{cm}$)	371	--	376	--	380	3
	Hardness (as CaCO_3)	191	--	192	--	200	3
	Calcium	57.0	--	57.0	--	60.0	3
	Magnesium	12.0	--	12.0	--	13.0	3
	Sodium	2.3	--	2.3	--	2.5	3
	Potassium	3.5	--	3.9	--	5.1	3
	Sodium adsorption ratio (unitless)	0.07	--	0.08	--	0.10	3
	Alkalinity (as CaCO_3)	194	--	197	--	198	3
	Chloride	0.90	--	1.0	--	1.8	3
	Fluoride	0.40	--	0.40	--	0.50	3
	Silica	42.0	--	42.0	--	43.0	3
	Sulfate	2.5	--	5.8	--	6.2	3
	Total dissolved solids	244	--	247	--	254	3
	Ammonia (as N)	0.01	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.04	--	--	--	0.11	2
	Nitrate (as N)	0.11	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	0.02	--	--	--	--	1
	Boron	10.0	--	--	--	--	1

Appendix E–3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Teewinot aquifer (springs)—Continued	Iron	10.0	--	--	--	--	1
	Iron, unfiltered	30.0	--	--	--	--	1
Teewinot aquifer (wells)	pH (standard units)	7.7	--	8.0	--	8.1	3
	Specific conductance ($\mu\text{S}/\text{cm}$)	253	--	316	--	395	3
	Hardness (as CaCO_3)	120	--	160	--	210	3
	Calcium	34.0	--	55.0	--	67.0	3
	Magnesium	4.6	--	8.6	--	10.0	3
	Sodium	2.7	--	3.7	--	3.7	3
	Potassium	3.4	--	3.7	--	4.0	3
	Sodium adsorption ratio (unitless)	0.10	--	0.11	--	0.11	3
	Alkalinity (as CaCO_3)	125	--	161	--	214	3
	Chloride	1.2	--	1.3	--	5.3	3
	Fluoride	0.30	--	0.30	--	0.50	3
	Silica	37.0	--	38.0	--	39.0	3
	Sulfate	1.6	--	2.6	--	3.3	3
	Total dissolved solids	166	--	212	--	260	3
	Ammonia (as N)	0.04	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.16	--	--	--	--	1
	Nitrate (as N)	0.05	--	--	--	0.16	2
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	0.04	--	--	--	--	1
	Boron	--	--	--	--	<20.0	2
	Iron	<10.0	--	--	--	20.0	2
Colter Formation (springs)	pH (standard units)	8.1	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	177	--	--	--	--	1
	Hardness (as CaCO_3)	87.2	--	--	--	--	1
	Calcium	27.0	--	--	--	--	1
	Magnesium	4.8	--	--	--	--	1
	Sodium	2.1	--	--	--	--	1
	Potassium	1.2	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.10	--	--	--	--	1
	Alkalinity (as CaCO_3)	91.0	--	--	--	--	1
	Chloride	0.80	--	--	--	--	1
	Fluoride	0.20	--	--	--	--	1
	Silica	21.0	--	--	--	--	1
	Sulfate	2.2	--	--	--	--	1
	Total dissolved solids	114	--	--	--	--	1
	Ammonia (as N)	0.03	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.07	--	--	--	--	1

Appendix E-3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Colter Formation (springs)—Continued	Nitrate (as N)	0.07	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	0.03	--	--	--	--	1
	Aluminum	20.0	--	--	--	--	1
	Arsenic	4.0	--	--	--	--	1
	Boron	<10.0	--	--	--	--	1
	Cadmium	<10.0	--	--	--	--	1
	Chromium	<1.0	--	--	--	--	1
	Copper	1.0	--	--	--	--	1
	Iron	7.0	--	--	--	--	1
	Lead	<1.0	--	--	--	--	1
	Manganese	6.0	--	--	--	--	1
	Mercury	<0.10	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
	Zinc	<3.0	--	--	--	--	1
Harebell Formation (springs)	pH (standard units)	7.7	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	500	--	--	--	--	1
	Hardness (as CaCO_3)	250	--	--	--	--	1
	Calcium	79.0	--	--	--	--	1
	Magnesium	13.0	--	--	--	--	1
	Sodium	9.6	--	--	--	--	1
	Potassium	1.4	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.26	--	--	--	--	1
	Alkalinity (as CaCO_3)	261	--	--	--	--	1
	Chloride	1.1	--	--	--	--	1
	Fluoride	0.20	--	--	--	--	1
	Silica	8.8	--	--	--	--	1
	Sulfate	5.8	--	--	--	--	1
	Total dissolved solids	278	--	--	--	--	1
	Boron	20.0	--	--	--	--	1
	Iron	10.0	--	--	--	--	1
Harebell Formation (wells)	pH (standard units)	7.4	--	--	--	9.4	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	474	--	--	--	524	2
	Hardness (as CaCO_3)	2.8	--	--	--	236	2
	Calcium	1.1	--	--	--	68.0	2
	Magnesium	0.02	--	--	--	16.0	2
	Sodium	22.0	--	--	--	110	2
	Potassium	0.20	--	--	--	3.2	2
	Sodium adsorption ratio (unitless)	0.62	--	--	--	28.5	2

Appendix E-3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Harebell Formation (wells)—Continued	Alkalinity (as CaCO_3)	230	--	--	--	271	2
	Chloride	4.1	--	--	--	6.1	2
	Fluoride	0.20	--	--	--	8.2	2
	Silica	13.0	--	--	--	20.0	2
	Sulfate	2.4	--	--	--	15.0	2
	Total dissolved solids	280	--	--	--	314	2
	Ammonia (as N)	0.01	--	--	--	0.03	2
	Nitrate plus nitrite (as N)	0.05	--	--	--	0.53	2
	Nitrate (as N)	0.05	--	--	--	0.53	2
	Nitrite (as N)	0.01	--	--	--	0.01	2
	Orthophosphate (as P)	0.01	--	--	--	0.06	2
	Aluminum	<10.0	--	--	--	--	1
	Arsenic	<1.0	--	--	--	--	1
	Boron	620	--	--	--	--	1
	Cadmium	<10.0	--	--	--	--	1
	Chromium	<1.0	--	--	--	--	1
	Copper	1.0	--	--	--	--	1
	Iron	53.0	--	--	--	--	1
	Lead	<1.0	--	--	--	--	1
	Manganese	1.0	--	--	--	--	1
	Mercury	<0.10	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
	Zinc	<3.0	--	--	--	--	1
Sohare Formation (wells)	pH (standard units)	8.4	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	1,330	--	--	--	--	1
	Hardness (as CaCO_3)	24.8	--	--	--	--	1
	Calcium	5.8	--	--	--	--	1
	Magnesium	2.5	--	--	--	--	1
	Sodium	309	--	--	--	--	1
	Potassium	3.1	--	--	--	--	1
	Sodium adsorption ratio (unitless)	27.0	--	--	--	--	1
	Alkalinity (as CaCO_3)	733	--	--	--	--	1
	Chloride	6.3	--	--	--	--	1
	Sulfate	1.0	--	--	--	--	1
	Total dissolved solids	866	--	--	--	--	1
	Nitrate plus nitrite (as N)	<0.10	--	--	--	--	1
	Iron	<50.0	--	--	--	--	1
	Iron, unfiltered	960	--	--	--	--	1
Bacon Ridge Sandstone (springs)	pH (standard units)	7.5	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	382	--	--	--	--	1

Appendix E-3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Bacon Ridge Sandstone (springs)—Continued	Hardness (as CaCO_3)	195	--	--	--	--	1
	Calcium	55.0	--	--	--	--	1
	Magnesium	14.0	--	--	--	--	1
	Sodium	6.3	--	--	--	--	1
	Potassium	1.3	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.20	--	--	--	--	1
	Alkalinity (as CaCO_3)	188	--	--	--	--	1
	Chloride	0.10	--	--	--	--	1
	Fluoride	0.10	--	--	--	--	1
	Silica	7.9	--	--	--	--	1
	Sulfate	18.0	--	--	--	--	1
	Total dissolved solids	216	--	--	--	--	1
	Ammonia (as N)	<0.01	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.18	--	--	--	--	1
	Nitrate (as N)	0.18	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	<0.01	--	--	--	--	1
	Phosphorus, unfiltered (as P)	<0.01	--	--	--	--	1
	Boron	10.0	--	--	--	--	1
	Iron	20.0	--	--	--	--	1
Bacon Ridge Sandstone (wells)	pH (standard units)	9.2	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	914	--	--	--	--	1
	Hardness (as CaCO_3)	4.6	--	--	--	--	1
	Calcium	1.3	--	--	--	--	1
	Magnesium	0.32	--	--	--	--	1
	Sodium	220	--	--	--	--	1
	Potassium	1.2	--	--	--	--	1
	Sodium adsorption ratio (unitless)	44.8	--	--	--	--	1
	Alkalinity (as CaCO_3)	502	--	--	--	--	1
	Chloride	2.4	--	--	--	--	1
	Fluoride	1.6	--	--	--	--	1
	Silica	9.4	--	--	--	--	1
	Sulfate	9.7	--	--	--	--	1
	Total dissolved solids	547	--	--	--	--	1
	Ammonia (as N)	0.31	--	--	--	--	1
	Nitrate plus nitrite (as N)	<0.05	--	--	--	--	1
	Nitrate (as N)	<0.05	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	0.06	--	--	--	--	1

Appendix E–3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Aspen confining unit (wells)	Specific conductance ($\mu\text{S}/\text{cm}$)	501	--	--	--	533	2
	Hardness (as CaCO_3)	86.3	--	--	--	227	2
	Calcium	28.3	--	--	--	72.3	2
	Magnesium	3.8	--	--	--	11.2	2
	Sodium	21.7	--	--	--	71.6	2
	Sodium adsorption ratio (unitless)	0.63	--	--	--	3.4	2
	Fluoride	1.2	--	--	--	11.7	2
	Sulfate	4.9	--	--	--	10.5	2
	Total dissolved solids	284	--	--	--	312	2
	Nitrate (as N)	0.38	--	--	--	0.99	2
Stump Formation (springs)	Nitrite (as N)	<0.10	--	--	--	--	1
	Iron	100	--	--	--	540	2
	pH (standard units)	7.6	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	465	--	--	--	--	1
	Calcium	67.0	--	--	--	--	1
	Magnesium	12.0	--	--	--	--	1
	Sodium	8.0	--	--	--	--	1
	Potassium	1.0	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.24	--	--	--	--	1
	Alkalinity (as CaCO_3)	226	--	--	--	--	1
Stump Formation (springs)	Chloride	2.7	--	--	--	--	1
	Fluoride	0.14	--	--	--	--	1
	Silica	17.1	--	--	--	--	1
	Sulfate	7.0	--	--	--	--	1
	Total dissolved solids	245	--	--	--	--	1
	Ammonia (as N)	0.05	--	--	--	--	1
	Nitrate (as N)	0.35	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Aluminum	<100	--	--	--	--	1
	Arsenic	<1.0	--	--	--	--	1
Stump Formation (springs)	Barium	290	--	--	--	--	1
	Boron	<100	--	--	--	--	1
	Cadmium	<10.0	--	--	--	--	1
	Chromium	<50.0	--	--	--	--	1
	Copper	<10.0	--	--	--	--	1
	Iron	<50.0	--	--	--	--	1
	Lead	<50.0	--	--	--	--	1
	Manganese	<10.0	--	--	--	--	1
	Mercury	<1.0	--	--	--	--	1

Appendix E-3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Stump Formation (springs)—Continued	Molybdenum	<100	--	--	--	--	1
	Nickel	<50.0	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
	Vanadium	<100	--	--	--	--	1
	Zinc	10.0	--	--	--	--	1
Amsden aquifer (wells)	Dissolved oxygen	5.2	--	--	--	--	1
	pH (standard units)	7.6	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	541	--	--	--	--	1
	Hardness (as CaCO_3)	231	--	--	--	--	1
	Calcium	58.0	--	--	--	--	1
	Magnesium	21.0	--	--	--	--	1
	Sodium	27.0	--	--	--	--	1
	Potassium	2.6	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.77	--	--	--	--	1
	Alkalinity (as CaCO_3)	201	--	--	--	--	1
	Chloride	18.0	--	--	--	--	1
	Fluoride	0.40	--	--	--	--	1
	Silica	19.0	--	--	--	--	1
	Sulfate	59.0	--	--	--	--	1
	Total dissolved solids	327	--	--	--	--	1
	Ammonia (as N)	<0.01	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.67	--	--	--	--	1
	Nitrate (as N)	0.67	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	0.01	--	--	--	--	1
	Phosphorus (as P)	0.01	--	--	--	--	1
	Dissolved organic carbon	0.30	--	--	--	--	1
	Boron	230	--	--	--	--	1
	Iron	4.0	--	--	--	--	1
	Manganese	<1.0	--	--	--	--	1
	Radon-222, unfiltered (picocuries per liter)	510	--	--	--	--	1
Madison aquifer (springs)	pH (standard units)	7.7	7.8	7.9	8.0	8.3	6
	Specific conductance ($\mu\text{S}/\text{cm}$)	237	348	422	480	850	6
	Hardness (as CaCO_3)	121	150	210	240	480	6
	Calcium	32.0	35.0	54.5	62.0	120	6
	Magnesium	10.0	17.0	18.5	21.0	44.0	6
	Sodium	0.90	3.2	5.1	7.2	7.6	6
	Potassium	0.40	1.6	1.7	2.6	2.7	6

Appendix E-3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Madison aquifer (springs)—Continued	Sodium adsorption ratio (unitless)	0.04	0.06	0.16	0.20	0.26	6
	Alkalinity (as CaCO_3)	122	144	148	171	190	6
	Chloride	1.8	2.2	2.3	2.4	2.9	6
	Fluoride	0.10	0.40	0.55	1.0	1.3	6
	Silica	4.5	9.8	11.0	13.0	14.0	6
	Sulfate	3.6	20.0	78.0	98.0	300	6
	Total dissolved solids	127	192	273	292	588	6
	Ammonia (as N)	0.04	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.06	--	--	--	0.11	2
	Nitrate (as N)	--	0.02	0.05	0.09	0.11	4
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	<0.01	--	--	--	--	1
	Arsenic	<50.0	--	--	--	--	1
	Barium	<500	--	--	--	--	1
	Boron	--	20.0	25.0	65.0	100	4
	Cadmium	<10.0	--	--	--	--	1
	Chromium	<100	--	--	--	--	1
	Copper	<10.0	--	--	--	--	1
	Iron	10.0	--	10.0	--	20.0	3
	Iron, unfiltered	10.0	--	--	--	110	2
	Lead	<100	--	--	--	--	1
	Manganese	<50.0	--	--	--	--	1
	Mercury	<1.0	--	--	--	--	1
	Nickel	<100	--	--	--	--	1
	Selenium	2.0	--	--	--	--	1
	Zinc	<20.0	--	--	--	--	1
Madison aquifer (wells)	pH (standard units)	7.0	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	431	--	--	--	--	1
	Hardness (as CaCO_3)	210	--	--	--	--	1
	Calcium	54.0	--	--	--	--	1
	Magnesium	19.0	--	--	--	--	1
	Sodium	6.4	--	--	--	--	1
	Potassium	2.1	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.20	--	--	--	--	1
	Alkalinity (as CaCO_3)	144	--	--	--	--	1
	Chloride	2.0	--	--	--	--	1
	Fluoride	0.80	--	--	--	--	1
	Silica	16.0	--	--	--	--	1

Appendix E-3. Summary statistics for water samples, Jackson Hole, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Madison aquifer (wells)—Continued	Sulfate	75.0	--	--	--	--	1
	Total dissolved solids	262	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.07	--	--	--	--	1
	Boron	30.0	--	--	--	--	1
	Iron	10.0	--	--	--	--	1
Gallatin aquifer and confining unit (wells)	pH (standard units)	7.9	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	555	--	--	--	--	1
	Hardness (as CaCO_3)	300	--	--	--	--	1
	Calcium	74.0	--	--	--	--	1
	Magnesium	27.0	--	--	--	--	1
	Sodium	2.7	--	--	--	--	1
	Potassium	1.6	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.07	--	--	--	--	1
	Alkalinity (as CaCO_3)	149	--	--	--	--	1
	Chloride	1.4	--	--	--	--	1
	Fluoride	0.40	--	--	--	--	1
	Silica	11.0	--	--	--	--	1
	Sulfate	150	--	--	--	--	1
	Total dissolved solids	355	--	--	--	--	1
	Boron	30.0	--	--	--	--	1
	Iron	10.0	--	--	--	--	1
Gros Ventre aquifer and confining unit (springs)	pH (standard units)	7.2	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	530	--	--	--	--	1
	Hardness (as CaCO_3)	175	--	--	--	--	1
	Calcium	36.0	--	--	--	--	1
	Magnesium	21.0	--	--	--	--	1
	Sodium	50.0	--	--	--	--	1
	Potassium	5.3	--	--	--	--	1
	Sodium adsorption ratio (unitless)	1.6	--	--	--	--	1
	Alkalinity (as CaCO_3)	205	--	--	--	--	1
	Chloride	23.0	--	--	--	--	1
	Fluoride	0.50	--	--	--	--	1
	Silica	15.0	--	--	--	--	1
	Sulfate	51.0	--	--	--	--	1
	Total dissolved solids	308	--	--	--	--	1
	Boron	140	--	--	--	--	1
	Iron, unfiltered	140	--	--	--	--	1

Appendix E-4

*Statistics for water samples,
Green and Hoback basins,
Wyoming*

Appendix E-4. Summary statistics for water samples, Green and Hoback River Basins, Wyoming.

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary alluvial aquifers (springs)	pH (standard units)	8.3	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	415	--	--	--	--	1
	Hardness (as CaCO_3)	220	--	--	--	--	1
	Calcium	71.0	--	--	--	--	1
	Magnesium	9.9	--	--	--	--	1
	Sodium	2.1	--	--	--	--	1
	Potassium	0.70	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.06	--	--	--	--	1
	Alkalinity (as CaCO_3)	143	--	--	--	--	1
	Chloride	1.5	--	--	--	--	1
	Fluoride	0.30	--	--	--	--	1
	Silica	5.8	--	--	--	--	1
	Sulfate	73.0	--	--	--	--	1
Quaternary alluvial aquifers (wells)	Total dissolved solids	250	--	--	--	--	1
	Boron	10.0	--	--	--	--	1
	Dissolved oxygen	3.3	--	--	--	--	1
	pH (standard units)	6.8	7.6	7.8	8.0	8.0	8
	Specific conductance ($\mu\text{S}/\text{cm}$)	490	545	597	635	670	8
	Hardness (as CaCO_3)	260	260	290	320	334	7
	Calcium	82.0	83.0	95.0	105	110	7
	Magnesium	6.0	13.0	13.0	15.0	17.1	7
	Sodium	2.7	5.4	5.9	7.0	8.6	7
	Potassium	0.90	1.1	1.4	1.9	2.8	7
	Sodium adsorption ratio (unitless)	0.10	0.10	0.14	0.20	0.20	7
	Alkalinity (as CaCO_3)	138	151	201	229	244	7
	Chloride	0.40	1.1	1.4	2.4	2.4	7
	Fluoride	0.10	0.20	0.20	0.20	0.30	7
Organic constituents	Silica	4.6	5.6	6.6	7.4	7.5	7
	Sulfate	37.0	88.0	99.0	160	166	7
	Total dissolved solids	285	319	356	382	445	7
	Ammonia, unfiltered (as N)	<0.05	--	--	--	--	1
	Nitrate (as N)	--	0.05	0.07	0.13	0.14	7
	Nitrite (as N)	<0.02	--	--	--	--	1
	Organic nitrogen, unfiltered (as N)	<0.10	--	--	--	--	1
	Orthophosphate (as P)	<0.01	--	--	--	--	1
	Dissolved organic carbon	0.60	--	--	--	--	1
	Aluminum	<100	--	--	--	--	1
Inorganic constituents	Antimony	<1.0	--	--	--	--	1

Appendix E-4. Summary statistics for water samples, Green and Hoback River Basins, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary alluvial aquifers (wells)—Continued	Arsenic	<4.0	--	--	--	--	1
	Barium	32.9	--	--	--	--	1
	Beryllium	<1.0	--	--	--	--	1
	Boron	--	--	--	--	<100	7
	Cadmium	<0.20	--	--	--	--	1
	Chromium	<5.0	--	--	--	--	1
	Cobalt	2.0	--	--	--	--	1
	Copper	5.0	--	--	--	--	1
	Iron	--	--	--	--	<100	3
	Iron, unfiltered	--	8.6	20.0	30.0	170	6
	Lead	1.0	--	--	--	--	1
	Manganese	<2.0	--	--	--	--	1
	Manganese, unfiltered	<2.0	--	--	--	--	1
	Molybdenum	11.0	--	--	--	--	1
	Nickel	<4.0	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
	Strontium	1,040	--	--	--	--	1
	Vanadium	<10.0	--	--	--	--	1
	Zinc	<50.0	--	--	--	--	1
	Radon-222, unfiltered (picocuries per liter)	930	--	--	--	--	1
	Uranium	0.60	--	--	--	--	1
Quaternary glacial-deposit aquifers (springs)	Calcium	58.1	--	58.9	--	66.3	3
	Magnesium	10.6	--	10.8	--	17.4	3
	Sodium	1.2	--	1.3	--	2.0	3
	Potassium	0.39	--	0.43	--	0.59	3
	Sodium adsorption ratio (unitless)	0.04	--	0.04	--	0.06	3
	Alkalinity (as CaCO_3)	238	--	259	--	289	3
	Chloride	0.21	--	0.57	--	0.60	3
	Silica	1.6	--	2.6	--	3.2	3
	Sulfate	1.6	--	2.0	--	30.6	3
	Total dissolved solids	205	--	224	--	228	3
Quaternary landslide deposits (springs)	pH (standard units)	7.2	--	--	--	8.2	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	165	--	--	--	--	1
	Hardness (as CaCO_3)	74.0	--	--	--	--	1
	Calcium	23.0	--	36.1	--	53.3	3
	Magnesium	4.0	--	7.3	--	12.3	3
	Sodium	0.46	--	1.3	--	4.3	3
	Potassium	0.08	--	0.27	--	0.50	3

Appendix E-4. Summary statistics for water samples, Green and Hoback River Basins, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary landslide deposits (springs)—Continued	Sodium adsorption ratio (unitless)	0.02	--	0.04	--	0.22	3
	Alkalinity (as CaCO_3)	67.2	--	170	--	199	3
	Chloride	0.14	--	0.71	--	4.9	3
	Fluoride	0.20	--	--	--	0.84	2
	Silica	1.3	--	1.8	--	3.6	3
	Sulfate	5.8	--	12.0	--	16.6	3
	Total dissolved solids	93.0	--	139	--	179	3
Wasatch zone of the Wasatch-Fort Union aquifer (Pass Peak Formation) (springs)	Boron	50.0	--	--	--	--	1
	pH (standard units)	8.2	--	--	--	8.2	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	485	--	--	--	640	2
	Hardness (as CaCO_3)	250	--	--	--	320	2
	Calcium	71.0	--	--	--	86.0	2
	Magnesium	17.0	--	--	--	27.0	2
	Sodium	3.2	--	--	--	16.0	2
	Potassium	1.6	--	--	--	3.5	2
	Sodium adsorption ratio (unitless)	0.09	--	--	--	0.39	2
	Alkalinity (as CaCO_3)	217	--	--	--	328	2
	Chloride	1.8	--	--	--	1.8	2
	Fluoride	0.20	--	--	--	0.20	2
	Silica	8.7	--	--	--	13.0	2
Fort Union zone of the Wasatch-Fort Union aquifer (Hoback Formation) (springs)	Sulfate	30.0	--	--	--	43.0	2
	Total dissolved solids	283	--	--	--	367	2
	Boron	20.0	--	--	--	20.0	2
	Iron	50.0	--	--	--	50.0	2
	pH (standard units)	7.7	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	387	--	--	--	--	1
	Hardness (as CaCO_3)	270	--	--	--	--	1
	Calcium	80.0	--	--	--	--	1
	Magnesium	17.0	--	--	--	--	1
	Sodium	2.8	--	--	--	--	1
	Potassium	0.60	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.07	--	--	--	--	1
	Alkalinity (as CaCO_3)	267	--	--	--	--	1
	Chloride	3.9	--	--	--	--	1
	Fluoride	0.10	--	--	--	--	1
	Silica	5.9	--	--	--	--	1
	Sulfate	4.4	--	--	--	--	1
	Total dissolved solids	275	--	--	--	--	1

Appendix E-4. Summary statistics for water samples, Green and Hoback River Basins, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Fort Union zone of the Wasatch-Fort Union aquifer (Hoback Formation) (springs)—Continued	Ammonia (as N)	<0.01	--	--	--	--	1
	Nitrate plus nitrite (as N)	<0.05	--	--	--	--	1
	Nitrate (as N)	<0.05	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	<0.01	--	--	--	--	1
	Phosphorus, unfiltered (as P)	<0.01	--	--	--	--	1
	Aluminum	<10.0	--	--	--	--	1
	Arsenic	<1.0	--	--	--	--	1
	Boron	10.0	--	--	--	--	1
	Chromium	<1.0	--	--	--	--	1
	Copper	<1.0	--	--	--	--	1
Fort Union zone of the Wasatch-Fort Union aquifer (Hoback Formation) (wells)	Lead	<1.0	--	--	--	--	1
	Mercury	0.10	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
	pH (standard units)	7.3	--	--	--	7.9	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	379	--	--	--	550	2
	Hardness (as CaCO_3)	199	--	--	--	270	2
	Calcium	50.0	--	--	--	89.0	2
	Magnesium	12.0	--	--	--	18.0	2
	Sodium	5.6	--	--	--	7.0	2
	Potassium	1.2	--	--	--	1.4	2
	Sodium adsorption ratio (unitless)	0.17	--	--	--	0.20	2
	Alkalinity (as CaCO_3)	185	--	--	--	190	2
	Chloride	1.8	--	--	--	3.3	2
	Fluoride	0.20	--	--	--	0.20	2
	Silica	6.0	--	--	--	8.2	2
	Sulfate	15.0	--	--	--	99.0	2
	Total dissolved solids	215	--	--	--	327	2
	Ammonia (as N)	<0.01	--	--	--	--	1
	Nitrate plus nitrite (as N)	<0.05	--	--	--	--	1
	Nitrate (as N)	<0.05	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	<0.01	--	--	--	--	1
	Phosphorus, unfiltered (as P)	0.01	--	--	--	--	1
	Aluminum	<10.0	--	--	--	--	1
	Arsenic	<1.0	--	--	--	--	1
	Boron	--	--	--	--	<20	2
	Chromium	<1.0	--	--	--	--	1
	Copper	<1.0	--	--	--	--	1
	Iron	20.0	--	--	--	--	1

Appendix E-4. Summary statistics for water samples, Green and Hoback River Basins, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Fort Union zone of the Wasatch-Fort Union aquifer (Hoback Formation) (wells)—Continued	Iron, unfiltered	20.0	--	--	--	--	1
	Lead	<1.0	--	--	--	--	1
	Mercury	<0.10	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
Tensleep aquifer (springs)	pH (standard units)	8.0	--	--	--	--	1
	Calcium	71.3	--	--	--	--	1
	Magnesium	25.5	--	--	--	--	1
	Sodium	2.1	--	--	--	--	1
	Potassium	0.08	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.05	--	--	--	--	1
	Alkalinity (as CaCO_3)	211	--	--	--	--	1
	Chloride	0.35	--	--	--	--	1
	Fluoride	0.84	--	--	--	--	1
	Silica	1.7	--	--	--	--	1
Madison aquifer (springs)	Sulfate	99.9	--	--	--	--	1
	Total dissolved solids	303	--	--	--	--	1
	Calcium	26.7	--	--	--	27.1	2
	Magnesium	5.7	--	--	--	6.9	2
	Sodium	0.18	--	--	--	0.39	2
	Potassium	0.20	--	--	--	0.31	2
	Sodium adsorption ratio (unitless)	0.008	--	--	--	0.02	2
	Alkalinity (as CaCO_3)	111	--	--	--	115	2
	Chloride	0.25	--	--	--	0.28	2
	Silica	1.1	--	--	--	1.6	2
	Sulfate	5.9	--	--	--	9.1	2
	Total dissolved solids	94.6	--	--	--	102	2

Appendix E-5

*Statistics for water samples,
Overthrust Belt, Wyoming*

Appendix E–5. Summary statistics for water samples, Overthrust Belt, Wyoming.

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary alluvial aquifers (wells)	pH (standard units)	7.4	7.6	7.6	7.7	7.8	8
	Specific conductance ($\mu\text{S}/\text{cm}$)	419	436	529	560	567	7
	Hardness (as CaCO_3)	215	250	257	270	290	6
	Calcium	52.0	64.0	68.0	83.0	83.0	7
	Magnesium	11.0	15.0	19.0	21.0	25.0	7
	Sodium	2.5	2.8	6.7	12.0	18.0	7
	Potassium	0.70	0.80	1.0	3.0	17.0	7
	Sodium adsorption ratio (unitless)	0.08	0.10	0.20	0.30	0.49	7
	Alkalinity (as CaCO_3)	180	191	219	238	255	7
	Chloride	0.80	1.0	1.6	13.0	20.0	7
	Fluoride	0.10	0.10	0.20	0.30	0.60	6
	Silica	6.6	7.9	9.9	12.0	13.0	6
	Sulfate	33.0	36.0	48.0	75.0	82.0	7
	Total dissolved solids	230	254	311	315	333	7
	Ammonia (as N)	<0.01	--	--	--	0.02	3
	Nitrate plus nitrite (as N)	--	0.43	0.54	0.70	0.98	6
	Nitrate (as N)	0.16	--	0.43	--	0.60	3
	Nitrite (as N)	--	--	--	--	<0.01	3
	Orthophosphate (as P)	0.02	--	0.02	--	0.02	3
	Boron	--	20.0	20.0	20.0	40.0	5
	Iron	<3.0	--	--	--	10.0	2
	Iron, unfiltered	10.0	--	50.0	--	60.0	3
	Manganese	--	--	--	--	<1.0	2
	Radon-222, unfiltered (picocuries per liter)	1,580	--	--	--	--	1
Quaternary terrace-deposit aquifers (springs)	pH (standard units)	7.6	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	419	--	--	--	--	1
	Hardness (as CaCO_3)	212	--	--	--	--	1
	Calcium	60.0	--	--	--	--	1
	Magnesium	15.0	--	--	--	--	1
	Sodium	3.8	--	--	--	--	1
	Potassium	0.70	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.11	--	--	--	--	1
	Alkalinity (as CaCO_3)	217	--	--	--	--	1
	Chloride	1.2	--	--	--	--	1
	Fluoride	0.20	--	--	--	--	1
	Silica	11.0	--	--	--	--	1
	Sulfate	9.1	--	--	--	--	1
	Total dissolved solids	231	--	--	--	--	1

Appendix E-5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary glacial-deposit aquifers (springs)	pH (standard units)	7.5	--	8.0	--	8.2	3
	Specific conductance ($\mu\text{S}/\text{cm}$)	254	--	319	--	391	3
	Hardness (as CaCO_3)	118	--	--	--	198	2
	Calcium	36.0	--	--	--	71.0	2
	Magnesium	5.0	--	--	--	6.9	2
	Sodium	2.1	--	--	--	2.5	2
	Potassium	0.30	--	--	--	0.60	2
	Sodium adsorption ratio (unitless)	0.08	--	--	--	0.08	2
	Alkalinity (as CaCO_3)	68.0	--	--	--	209	2
	Chloride	0.20	--	--	--	0.50	2
	Fluoride	0.10	--	--	--	0.20	2
	Silica	8.8	--	--	--	9.0	2
Quaternary landslide deposits (springs)	Sulfate	2.7	--	--	--	54.0	2
	Total dissolved solids	149	--	--	--	215	2
	pH (standard units)	7.0	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	403	--	--	--	--	1
	Hardness (as CaCO_3)	202	--	--	--	--	1
	Calcium	67.0	--	--	--	--	1
	Magnesium	8.5	--	--	--	--	1
	Sodium	4.9	--	--	--	--	1
	Potassium	1.4	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.15	--	--	--	--	1
	Alkalinity (as CaCO_3)	194	--	--	--	--	1
	Chloride	4.1	--	--	--	--	1
Salt Lake aquifer (springs)	Fluoride	0.10	--	--	--	--	1
	Silica	9.4	--	--	--	--	1
	Sulfate	22.0	--	--	--	--	1
	Total dissolved solids	234	--	--	--	--	1
	Ammonia (as N)	0.05	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.11	--	--	--	--	1
	Nitrate (as N)	0.11	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	0.03	--	--	--	--	1
	pH (standard units)	7.3	--	--	--	8.1	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	346	--	--	--	360	2
	Hardness (as CaCO_3)	189	--	--	--	200	2
	Calcium	41.0	--	--	--	64.0	2
	Magnesium	7.0	--	--	--	24.0	2
	Sodium	1.6	--	--	--	3.0	2

Appendix E-5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Salt Lake aquifer (springs)— Continued	Potassium	0.60	--	--	--	1.0	2
	Sodium adsorption ratio (unitless)	0.10	--	--	--	0.10	2
	Alkalinity (as CaCO_3)	167	--	--	--	203	2
	Chloride	0.70	--	--	--	1.0	2
	Fluoride	0.10	--	--	--	0.10	2
	Silica	7.9	--	--	--	--	1
	Sulfate	3.8	--	--	--	17.0	2
	Total dissolved solids	193	--	--	--	202	2
	Ammonia (as N)	<0.10	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.10	--	--	--	0.26	2
Camp Davis aquifer (wells)	Phosphorus, unfiltered (as P)	0.04	--	--	--	--	1
	Boron	20.0	--	--	--	--	1
	Iron, unfiltered	30.0	--	--	--	--	1
	pH (standard units)	7.5	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	511	--	--	--	--	1
	Hardness (as CaCO_3)	280	--	--	--	--	1
	Calcium	96.0	--	--	--	--	1
	Magnesium	9.7	--	--	--	--	1
	Sodium	4.8	--	--	--	--	1
	Potassium	1.9	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.12	--	--	--	--	1
	Alkalinity (as CaCO_3)	250	--	--	--	--	1
	Chloride	9.8	--	--	--	--	1
	Fluoride	0.20	--	--	--	--	1
	Silica	14.0	--	--	--	--	1
	Sulfate	17.0	--	--	--	--	1
	Total dissolved solids	306	--	--	--	--	1
	Ammonia (as N)	<0.01	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.58	--	--	--	--	1
	Nitrate (as N)	0.58	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	0.01	--	--	--	--	1
	Phosphorus, unfiltered (as P)	0.15	--	--	--	--	1
	Aluminum	10.0	--	--	--	--	1
	Arsenic	<1.0	--	--	--	--	1
	Boron	20.0	--	--	--	--	1
	Chromium	<1.0	--	--	--	--	1
	Copper	2.0	--	--	--	--	1
	Lead	<1.0	--	--	--	--	1

Appendix E-5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Camp Davis aquifer (wells)— Continued	Mercury	<0.10	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
Blind Bull Formation (springs)	pH (standard units)	7.9	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	303	--	--	--	--	1
	Hardness (as CaCO_3)	140	--	--	--	--	1
	Calcium	37.0	--	--	--	--	1
	Magnesium	11.0	--	--	--	--	1
	Sodium	9.3	--	--	--	--	1
	Potassium	1.0	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.30	--	--	--	--	1
	Alkalinity (as CaCO_3)	141	--	--	--	--	1
	Chloride	1.0	--	--	--	--	1
	Fluoride	0.40	--	--	--	--	1
	Silica	5.7	--	--	--	--	1
	Sulfate	21.0	--	--	--	--	1
	Total dissolved solids	172	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.16	--	--	--	--	1
	Boron	50.0	--	--	--	--	1
	Iron	20.0	--	--	--	--	1
Aspen confining unit (springs)	pH (standard units)	7.5	7.6	7.8	8.1	8.5	9
	Specific conductance ($\mu\text{S}/\text{cm}$)	317	326	336	359	390	7
	Hardness (as CaCO_3)	130	135	145	167	184	4
	Calcium	31.0	45.0	50.9	54.0	62.0	6
	Magnesium	4.1	4.6	5.9	7.1	11.0	6
	Sodium	0.62	0.64	10.9	14.0	21.0	6
	Potassium	0.23	0.23	1.5	1.6	1.6	6
	Sodium adsorption ratio (unitless)	0.02	0.03	0.39	0.50	0.80	6
	Alkalinity (as CaCO_3)	107	167	174	180	195	6
	Chloride	0.25	0.25	1.0	1.4	3.1	6
	Fluoride	0.30	0.30	0.30	0.65	1.0	4
	Silica	2.3	2.4	9.1	12.0	17.0	6
	Sulfate	1.2	1.4	7.9	14.0	17.0	6
	Total dissolved solids	107	173	195	212	228	6
	Nitrate plus nitrite (as N)	0.06	--	0.14	--	0.17	3
	Nitrate (as N)	0.60	--	--	--	--	1
	Boron	20.0	--	30.0	--	60.0	3
	Iron, unfiltered	10.0	--	10.0	--	40.0	3

Appendix E-5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Aspen confining unit (wells)	pH (standard units)	7.4	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	515	--	--	--	--	1
	Hardness (as CaCO_3)	268	--	--	--	--	1
	Calcium	76.0	--	--	--	--	1
	Magnesium	19.0	--	--	--	--	1
	Sodium	11.0	--	--	--	--	1
	Potassium	0.70	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.29	--	--	--	--	1
	Alkalinity (as CaCO_3)	271	--	--	--	--	1
	Chloride	6.6	--	--	--	--	1
	Fluoride	0.20	--	--	--	--	1
	Silica	19.0	--	--	--	--	1
	Sulfate	9.4	--	--	--	--	1
	Total dissolved solids	308	--	--	--	--	1
	Ammonia (as N)	<0.01	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.79	--	--	--	--	1
	Nitrate (as N)	0.79	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	0.03	--	--	--	--	1
	Phosphorus, unfiltered (as P)	0.02	--	--	--	--	1
	Aluminum	10.0	--	--	--	--	1
	Arsenic	1.0	--	--	--	--	1
	Boron	20.0	--	--	--	--	1
	Chromium	1.0	--	--	--	--	1
	Copper	2.0	--	--	--	--	1
	Lead	1.0	--	--	--	--	1
	Mercury	<0.10	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
Bear River aquifer (springs)	pH (standard units)	7.8	7.9	8.0	8.1	8.2	4
	Specific conductance ($\mu\text{S}/\text{cm}$)	402	413	435	452	457	4
	Hardness (as CaCO_3)	213	214	227	248	256	4
	Calcium	64.0	65.0	66.0	71.0	76.0	4
	Magnesium	12.0	12.5	14.5	17.0	18.0	4
	Sodium	1.0	2.3	5.4	8.1	9.0	4
	Potassium	0.40	0.65	1.3	1.6	1.6	4
	Sodium adsorption ratio (unitless)	0.03	0.07	0.15	0.24	0.27	4
	Alkalinity (as CaCO_3)	202	206	225	241	243	4
	Chloride	2.1	2.6	3.1	4.2	5.2	4
	Fluoride	0.20	0.20	0.25	0.30	0.30	4

Appendix E-5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Bear River aquifer (springs)— Continued	Silica	7.5	7.7	7.9	8.4	8.8	4
	Sulfate	3.3	4.1	7.0	12.5	16.0	4
	Total dissolved solids	226	234	248	259	264	4
	Nitrate (as N)	0.40	--	0.40	--	0.50	3
Bear River aquifer (wells)	pH (standard units)	6.7	7.5	7.7	8.1	8.9	8
	Specific conductance ($\mu\text{S}/\text{cm}$)	328	462	869	1,380	1,710	8
	Hardness (as CaCO_3)	4.9	161	201	350	445	6
	Calcium	1.1	54.0	64.5	120	172	8
	Magnesium	0.51	6.8	13.5	24.0	37.0	8
	Sodium	7.9	16.1	36.0	125	410	8
	Potassium	0.70	1.6	2.1	2.9	7.0	8
	Sodium adsorption ratio (unitless)	0.20	0.54	0.90	3.1	81.0	8
	Alkalinity (as CaCO_3)	175	220	317	401	699	8
	Chloride	1.3	4.2	12.0	101	319	8
	Fluoride	0.10	0.20	0.73	1.9	3.3	7
	Silica	7.2	12.0	13.0	17.0	19.0	7
	Sulfate	3.0	14.1	24.5	27.5	210	8
	Total dissolved solids	197	250	504	884	1,120	8
	Ammonia (as N)	<0.01	--	0.12	--	0.17	3
	Nitrate plus nitrite (as N)	--	3.8	7.8	8.9	9.7	4
	Nitrate (as N)	--	0.28	2.8	7.2	9.7	5
	Nitrite (as N)	<0.01	--	--	--	0.27	4
	Orthophosphate (as P)	0.01	--	0.04	--	0.04	3
	Phosphorus, unfiltered (as P)	0.01	--	--	--	0.12	2
	Aluminum	<10.0	--	--	--	10.0	3
	Arsenic	<1.0	--	--	--	1.0	4
	Barium	100	--	--	--	400	2
	Beryllium	--	--	--	--	<0.05	2
	Boron	--	50.0	60.0	120	410	5
	Cadmium	--	--	--	--	<10.0	3
	Chromium	--	--	--	--	<1.0	3
	Cobalt	--	--	--	--	<3.0	2
	Copper	<1.0	--	7.0	--	9.0	3
	Iron	16.0	--	28.0	--	54.0	3
	Iron, unfiltered	10.0	--	--	--	30.0	2
	Lead	--	--	--	--	<1.0	3
	Lithium	23.0	--	--	--	37.0	2
	Manganese	1.0	--	2.0	--	4.0	3
	Mercury	--	--	--	--	<0.10	3

Appendix E-5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Bear River aquifer (wells)— Continued	Selenium	<1.0	--	--	--	2.0	3
	Strontium	220	--	--	--	430	2
	Zinc	5.0	--	26.0	--	260	3
Gannett aquifer and confining unit (springs)	pH (standard units)	7.4	--	7.6	--	8.0	3
	Specific conductance ($\mu\text{S}/\text{cm}$)	241	--	352	--	407	3
	Hardness (as CaCO_3)	100	--	180	--	200	3
	Calcium	29.0	--	48.0	--	57.0	3
	Magnesium	7.8	--	8.8	--	19.0	3
	Sodium	5.1	--	8.2	--	10.0	3
	Potassium	0.70	--	0.80	--	1.0	3
	Sodium adsorption ratio (unitless)	0.20	--	0.30	--	0.40	3
	Alkalinity (as CaCO_3)	107	--	194	--	220	3
	Chloride	1.4	--	1.7	--	2.1	3
	Fluoride	0.10	--	--	--	0.20	2
	Silica	7.6	--	9.2	--	12.0	3
	Sulfate	4.0	--	7.1	--	21.0	3
	Total dissolved solids	141	--	208	--	228	3
Gannett aquifer and confining unit (wells)	Nitrate plus nitrite (as N)	0.04	--	0.19	--	0.32	3
	Boron	20.0	--	40.0	--	40.0	3
	Iron, unfiltered	20.0	--	--	--	20.0	2
	pH (standard units)	8.6	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	390	--	--	--	--	1
	Hardness (as CaCO_3)	264	--	--	--	--	1
	Calcium	86.0	--	--	--	--	1
	Magnesium	12.0	--	--	--	--	1
	Sodium	8.0	--	--	--	--	1
	Potassium	1.0	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.21	--	--	--	--	1
	Alkalinity (as CaCO_3)	248	--	--	--	--	1
	Chloride	11.0	--	--	--	--	1
	Fluoride	0.26	--	--	--	--	1
	Sulfate	16.0	--	--	--	--	1
Gannett aquifer and confining unit (springs)	Total dissolved solids	318	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.28	--	--	--	--	1
	Nitrate (as N)	4.9	--	--	--	--	1
	Arsenic	<10.0	--	--	--	--	1
	Barium	220	--	--	--	--	1
	Boron	30.0	--	--	--	--	1
	Cadmium	<10.0	--	--	--	--	1

Appendix E-5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Gannett aquifer and confining unit (wells)—Continued	Chromium	<50.0	--	--	--	--	1
	Iron, unfiltered	10.0	--	--	--	--	1
	Lead	<50.0	--	--	--	--	1
	Mercury	<1.0	--	--	--	--	1
	Selenium	<10.0	--	--	--	--	1
	Uranium	<1.0	--	--	--	--	1
Stump Formation (springs)	pH (standard units)	7.7	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	442	--	--	--	--	1
	Hardness (as CaCO_3)	229	--	--	--	--	1
	Calcium	67.0	--	--	--	--	1
	Magnesium	15.0	--	--	--	--	1
	Sodium	3.0	--	--	--	--	1
	Potassium	0.40	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.09	--	--	--	--	1
	Alkalinity (as CaCO_3)	221	--	--	--	--	1
	Chloride	0.80	--	--	--	--	1
	Fluoride	0.20	--	--	--	--	1
	Silica	9.1	--	--	--	--	1
	Sulfate	4.4	--	--	--	--	1
Twin Creek aquifer (springs)	Total dissolved solids	241	--	--	--	--	1
	pH (standard units)	7.4	7.6	7.8	7.8	7.9	6
	Specific conductance ($\mu\text{S}/\text{cm}$)	230	275	350	421	526	9
	Hardness (as CaCO_3)	109	169	196	250	280	7
	Calcium	24.0	51.0	57.9	80.0	82.0	7
	Magnesium	0.75	9.2	13.0	17.0	18.0	7
	Sodium	1.6	2.0	3.0	4.3	5.7	7
	Potassium	0.50	0.70	0.70	1.0	1.0	6
	Sodium adsorption ratio (unitless)	0.06	0.06	0.09	0.10	0.24	7
	Alkalinity (as CaCO_3)	104	138	184	230	257	7
	Chloride	0.21	0.45	1.0	1.9	3.1	10
	Fluoride	0.09	0.10	0.10	0.10	0.20	9
	Silica	8.6	--	9.5	--	12.0	3
	Sulfate	5.1	13.0	19.0	37.0	67.0	10
	Total dissolved solids	133	174	219	282	326	7
	Ammonia (as N)	--	--	--	--	<0.10	3
	Nitrate plus nitrite (as N)	--	0.10	0.13	0.15	0.19	5
	Nitrate (as N)	0.39	--	--	--	--	1
	Phosphorus (as P)	0.01	--	--	--	--	1
	Phosphorus, unfiltered (as P)	0.01	--	--	--	0.01	2

Appendix E-5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Twin Creek aquifer (springs)—Continued	Arsenic	--	--	--	--	<2.0	4
	Barium	<100	--	--	--	--	1
	Boron	40.0	--	--	--	--	1
	Cadmium	1.0	--	--	--	--	1
	Chromium	<5.0	--	--	--	--	1
	Copper	--	3.2	3.8	4.5	5.7	6
	Iron	--	--	--	--	<30.0	4
	Iron, unfiltered	10.0	--	--	--	--	1
	Lead	--	--	--	--	<50.0	4
	Manganese	--	--	--	--	<10.0	4
	Mercury	<0.20	--	--	--	--	1
	Molybdenum	<1.0	--	1.5	--	2.2	3
	Selenium	<1.0	--	--	--	--	1
	Zinc	--	5.0	5.8	6.6	7.0	6
	Gross alpha radioactivity (picocuries per liter)	2.6	--	--	--	--	1
	Gross beta radioactivity (picocuries per liter)	1.5	--	--	--	--	1
	Radium-226 (picocuries per liter)	<0.20	--	--	--	--	1
	Radium-228 (picocuries per liter)	4.4	--	--	--	--	1
	Uranium	0.18	--	0.20	--	0.20	3
Nugget aquifer (springs)	pH (standard units)	6.8	7.6	7.7	8.0	8.3	10
	Specific conductance ($\mu\text{S}/\text{cm}$)	178	185	243	253	605	5
	Hardness (as CaCO_3)	90.5	91.9	112	224	317	4
	Calcium	5.8	23.6	29.0	38.1	89.0	9
	Magnesium	1.8	4.4	6.6	7.5	23.0	9
	Sodium	0.99	1.2	1.4	1.5	2.1	9
	Potassium	0.27	0.31	0.40	0.90	4.4	9
	Sodium adsorption ratio (unitless)	0.04	0.05	0.06	0.07	0.09	9
	Alkalinity (as CaCO_3)	21.7	79.6	87.7	117	125	9
	Chloride	0.21	0.46	0.57	1.7	2.1	9
	Fluoride	0.10	0.15	0.20	0.25	0.30	4
	Silica	2.4	2.8	3.8	8.0	10.0	9
	Sulfate	1.0	1.8	3.8	4.9	190	9
	Total dissolved solids	30.0	85.0	106	134	388	9
	Nitrate (as N)	0.07	--	--	--	0.60	2
Nugget aquifer (wells)	pH (standard units)	7.8	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	465	--	--	--	--	1

Appendix E-5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Nugget aquifer (wells)— Continued	Hardness (as CaCO_3)	236	--	--	--	--	1
	Calcium	50.0	--	--	--	--	1
	Magnesium	27.0	--	--	--	--	1
	Sodium	3.6	--	--	--	--	1
	Potassium	1.3	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.10	--	--	--	--	1
	Alkalinity (as CaCO_3)	177	--	--	--	--	1
	Chloride	2.5	--	--	--	--	1
	Fluoride	0.20	--	--	--	--	1
	Silica	10.0	--	--	--	--	1
	Sulfate	69.0	--	--	--	--	1
	Total dissolved solids	269	--	--	--	--	1
	Ammonia (as N)	0.02	--	--	--	--	1
	Nitrate plus nitrite (as N)	<0.05	--	--	--	--	1
Ankareh aquifer (springs)	Nitrate (as N)	<0.05	--	--	--	--	1
	Nitrite (as N)	<0.01	--	--	--	--	1
	Orthophosphate (as P)	<0.01	--	--	--	--	1
	pH (standard units)	7.7	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	533	--	--	--	--	1
	Hardness (as CaCO_3)	231	--	--	--	235	2
	Calcium	59.0	--	--	--	73.8	2
	Magnesium	0.92	--	--	--	21.0	2
	Sodium	1.6	--	--	--	7.0	2
	Potassium	1.0	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.05	--	--	--	0.20	2
	Alkalinity (as CaCO_3)	170	--	--	--	214	2
	Chloride	1.3	--	--	--	25.0	2
	Fluoride	0.10	--	--	--	0.10	2
	Sulfate	28.5	--	--	--	47.0	2
	Total dissolved solids	263	--	--	--	364	2
	Ammonia (as N)	<0.10	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.26	--	--	--	--	1
	Nitrate (as N)	0.22	--	--	--	--	1
	Phosphorus, unfiltered (as P)	0.01	--	--	--	--	1
	Arsenic	<1.0	--	--	--	--	1
	Barium	<100	--	--	--	--	1
	Cadmium	1.0	--	--	--	--	1
	Chromium	<5.0	--	--	--	--	1
	Iron	30.0	--	--	--	--	1

Appendix E-5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Ankareh aquifer (springs)— Continued	Lead	<5.0	--	--	--	--	1
	Manganese	7.0	--	--	--	--	1
	Mercury	<0.20	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
	Gross alpha radioactivity (picocuries per liter)	<1.0	--	--	--	--	1
	Gross beta radioactivity (picocuries per liter)	1.9	--	--	--	--	1
	Radium-226 (picocuries per liter)	<0.20	--	--	--	--	1
Thaynes aquifer (springs)	Radium-228 (picocuries per liter)	1.9	--	--	--	--	1
	pH (standard units)	7.4	7.7	7.9	8.0	8.2	6
	Specific conductance ($\mu\text{S}/\text{cm}$)	364	--	--	--	--	1
	Hardness (as CaCO_3)	206	--	--	--	--	1
	Calcium	23.3	35.4	46.0	49.7	52.0	6
	Magnesium	6.9	12.1	12.7	13.8	19.0	6
	Sodium	0.53	0.90	0.97	1.7	2.0	6
	Potassium	0.23	0.27	0.99	2.6	4.2	6
	Sodium adsorption ratio (unitless)	0.02	0.03	0.03	0.06	0.06	6
	Alkalinity (as CaCO_3)	89.3	114	130	152	153	6
	Chloride	0.07	0.25	0.27	0.39	1.0	6
	Fluoride	0.20	--	--	--	--	1
	Silica	1.4	2.1	2.1	2.9	3.0	5
	Sulfate	2.4	11.5	27.8	53.9	57.0	6
	Total dissolved solids	89.0	146	186	200	281	6
	Ammonia (as N)	<0.10	--	--	--	--	1
Woodside confining unit (springs)	Nitrate plus nitrite (as N)	0.18	--	--	--	--	1
	Phosphorus, unfiltered (as P)	0.01	--	--	--	--	1
	Arsenic	2.0	--	--	--	--	1
	Copper	<10.0	--	--	--	--	1
	Iron	<30.0	--	--	--	--	1
	Lead	<50.0	--	--	--	--	1
	Manganese	<10.0	--	--	--	--	1
	Zinc	<10.0	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	230	--	--	--	460	2
	Chloride	0.49	--	--	--	0.51	2
	Fluoride	0.24	--	--	--	0.40	2
	Sulfate	3.2	--	--	--	85.0	2
	Copper	4.0	--	--	--	--	1
	Molybdenum	1.0	--	--	--	--	1

Appendix E-5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Woodside confining unit (springs)—Continued	Zinc	2.0	--	--	--	--	1
	Uranium	0.22	--	--	--	0.44	2
Phosphoria aquifer (springs)	Specific conductance ($\mu\text{S}/\text{cm}$)	320	--	--	--	--	1
	Chloride	0.19	--	--	--	--	1
	Fluoride	0.10	--	--	--	--	1
	Sulfate	39.0	--	--	--	--	1
	Copper	3.7	--	--	--	--	1
	Molybdenum	2.0	--	--	--	--	1
	Zinc	8.0	--	--	--	--	1
	Uranium	0.56	--	--	--	--	1
Wells aquifer (springs)	pH (standard units)	6.6	7.7	7.7	7.9	8.0	10
	Specific conductance ($\mu\text{S}/\text{cm}$)	220	240	287	310	411	6
	Hardness (as CaCO_3)	140	153	168	200	230	4
	Calcium	26.2	39.2	42.9	46.0	61.4	10
	Magnesium	9.2	11.3	13.7	16.4	26.0	10
	Sodium	0.30	0.80	0.90	0.99	1.7	10
	Potassium	0.30	0.30	0.94	2.7	2.8	10
	Sodium adsorption ratio (unitless)	0.01	0.01	0.03	0.03	0.03	10
	Alkalinity (as CaCO_3)	104	135	160	178	223	10
	Chloride	0.31	0.39	0.44	0.95	2.1	12
	Fluoride	0.10	0.12	0.20	0.30	0.40	5
	Silica	2.2	2.5	2.9	4.5	6.9	10
	Sulfate	1.2	3.2	7.7	11.2	22.9	12
	Total dissolved solids	114	143	171	193	239	10
	Nitrate plus nitrite (as N)	0.25	--	0.38	--	0.51	3
	Nitrate (as N)	0.27	--	--	--	--	1
	Boron	10.0	--	--	--	20.0	2
	Copper	2.1	--	--	--	2.8	2
	Iron	10.0	--	--	--	--	1
	Iron, unfiltered	10.0	--	--	--	10.0	2
	Molybdenum	<1.0	--	--	--	2.5	2
	Zinc	3.0	--	--	--	14.0	2
	Uranium	0.20	--	--	--	0.40	2
Wells aquifer (wells)	pH (standard units)	7.8	--	--	--	--	1
	Calcium	59.5	--	--	--	--	1
	Magnesium	22.0	--	--	--	--	1
	Sodium	3.2	--	--	--	--	1
	Potassium	2.6	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.09	--	--	--	--	1

Appendix E-5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Wells aquifer (wells)— Continued	Alkalinity (as CaCO_3)	210	--	--	--	--	1
	Chloride	1.0	--	--	--	--	1
	Fluoride	0.76	--	--	--	--	1
	Sulfate	91.7	--	--	--	--	1
	Total dissolved solids	317	--	--	--	--	1
	Nitrate (as N)	0.27	--	--	--	--	1
Amsden aquifer (springs)	pH (standard units)	7.9	--	7.9	--	8.2	3
	Calcium	28.9	--	33.2	--	41.7	3
	Magnesium	11.4	--	12.8	--	14.0	3
	Sodium	0.46	--	0.53	--	0.69	3
	Potassium	0.23	--	0.39	--	0.39	3
	Sodium adsorption ratio (unitless)	0.02	--	0.02	--	0.03	3
	Alkalinity (as CaCO_3)	122	--	140	--	145	3
	Chloride	0.28	--	0.39	--	0.46	3
	Silica	2.3	--	--	--	2.4	2
	Sulfate	1.9	--	2.9	--	33.3	3
	Total dissolved solids	119	--	138	--	178	3
Madison aquifer (hot springs)	pH (standard units)	7.8	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	1,550	--	--	--	--	1
	Hardness (as CaCO_3)	590	--	--	--	--	1
	Calcium	170	--	--	--	--	1
	Magnesium	43.0	--	--	--	--	1
	Sodium	120	--	--	--	--	1
	Potassium	13.0	--	--	--	--	1
	Sodium adsorption ratio (unitless)	2.1	--	--	--	--	1
	Alkalinity (as CaCO_3)	300	--	--	--	--	1
	Chloride	97.0	--	--	--	--	1
	Fluoride	0.40	--	--	--	--	1
	Silica	26.0	--	--	--	--	1
	Sulfate	520	--	--	--	--	1
	Total dissolved solids	1,160	--	--	--	--	1
	Arsenic	<50.0	--	--	--	--	1
	Barium	<500	--	--	--	--	1
	Boron	170	--	--	--	--	1
	Cadmium	<10.0	--	--	--	--	1
	Chromium	<100	--	--	--	--	1
	Copper	<10.0	--	--	--	--	1
	Lead	<100	--	--	--	--	1
	Manganese	<50.0	--	--	--	--	1

Appendix E-5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Madison aquifer (hot springs)— Continued	Mercury	<1.0	--	--	--	--	1
	Nickel	<100	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
	Zinc	330	--	--	--	--	1
Madison aquifer (springs)	pH (standard units)	7.7	7.8	7.9	8.0	8.3	18
	Specific conductance ($\mu\text{S}/\text{cm}$)	195	--	338	--	511	3
	Hardness (as CaCO_3)	97.8	146	149	170	266	5
	Calcium	24.4	38.4	48.2	67.0	79.9	18
	Magnesium	6.8	12.7	14.6	19.3	24.0	18
	Sodium	0.23	0.55	0.62	0.80	1.4	18
	Potassium	0.20	0.47	0.57	0.78	3.9	18
	Sodium adsorption ratio (unitless)	0.01	0.02	0.02	0.02	0.05	18
	Alkalinity (as CaCO_3)	77.6	128	132	150	191	18
	Chloride	0.07	0.25	0.30	0.50	1.1	18
	Fluoride	0.30	--	0.40	--	0.40	3
	Silica	1.3	2.5	2.6	4.0	5.6	9
	Sulfate	4.8	7.0	21.7	79.2	132	18
	Total dissolved solids	89.0	136	194	253	319	18
	Ammonia (as N)	--	--	--	--	<0.10	2
	Nitrate plus nitrite (as N)	0.15	--	--	--	0.19	2
	Nitrate (as N)	<1.0	--	--	--	--	1
	Phosphorus, unfiltered (as P)	0.01	--	--	--	0.02	2
	Arsenic	<2.0	--	--	--	3.0	2
	Barium	<300	--	--	--	--	1
	Boron	10.0	--	--	--	--	1
	Cadmium	<2.0	--	--	--	--	1
	Chromium	<4.0	--	--	--	--	1
	Copper	--	--	--	--	<10.0	2
	Iron	--	--	--	--	<30.0	2
	Iron, unfiltered	20.0	--	--	--	--	1
	Lead	--	--	--	--	<50.0	2
	Manganese	--	--	--	--	<10.0	2
	Mercury	<0.20	--	--	--	--	1
	Nickel	<20.0	--	--	--	--	1
	Selenium	<2.0	--	--	--	--	1
	Zinc	20.0	--	--	--	25.0	2
Madison aquifer (wells)	pH (standard units)	7.5	--	--	--	8.5	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	310	--	--	--	1,630	2
	Hardness (as CaCO_3)	158	--	--	--	640	2
	Calcium	50.0	--	--	--	180	2

Appendix E–5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Madison aquifer (wells)— Continued	Magnesium	8.0	--	--	--	46.0	2
	Sodium	10.0	--	--	--	110	2
	Potassium	2.0	--	--	--	14.0	2
	Sodium adsorption ratio (unitless)	0.35	--	--	--	1.9	2
	Alkalinity (as CaCO_3)	179	--	--	--	253	2
	Chloride	7.0	--	--	--	90.0	2
	Fluoride	0.40	--	--	--	0.44	2
	Silica	27.0	--	--	--	--	1
	Sulfate	7.0	--	--	--	530	2
	Total dissolved solids	110	--	--	--	1,150	2
	Nitrate plus nitrite (as N)	0.04	--	--	--	--	1
	Nitrate (as N)	<0.01	--	--	--	--	1
	Arsenic	<10.0	--	--	--	--	1
	Barium	80.0	--	--	--	--	1
	Boron	230	--	--	--	--	1
	Cadmium	<10.0	--	--	--	--	1
	Chromium	<50.0	--	--	--	--	1
	Iron, unfiltered	5,000	--	--	--	--	1
	Lead	<50.0	--	--	--	--	1
	Mercury	<1.0	--	--	--	--	1
	Selenium	<10.0	--	--	--	--	1
	Gross alpha radioactivity (picocuries per liter)	4.0	--	--	--	--	1
	Gross beta radioactivity (picocuries per liter)	1.0	--	--	--	--	1
	Uranium	<1.0	--	--	--	--	1
Darby aquifer (springs)	Dissolved oxygen	1.8	--	--	--	--	1
	pH (standard units)	7.2	7.4	7.6	7.9	8.1	4
	Specific conductance ($\mu\text{S}/\text{cm}$)	389	--	1,520	--	1,580	3
	Hardness (as CaCO_3)	206	--	870	--	1,100	3
	Calcium	35.1	43.0	151	280	310	4
	Magnesium	11.2	15.1	39.5	64.0	68.0	4
	Sodium	0.46	0.68	1.9	2.9	3.0	4
	Potassium	0.20	0.35	0.75	1.2	1.3	4
	Sodium adsorption ratio (unitless)	0.01	0.01	0.02	0.03	0.04	4
	Alkalinity (as CaCO_3)	128	144	171	196	210	4
	Chloride	0.18	0.44	0.70	1.1	1.5	4
	Fluoride	0.10	--	0.80	--	1.1	3
	Silica	1.8	3.6	5.8	6.3	6.3	4

Appendix E–5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Darby aquifer (springs)— Continued	Sulfate	2.3	5.2	359	770	830	4
	Total dissolved solids	134	171	719	1,280	1,330	4
	Nitrate plus nitrite (as N)	0.03	--	--	--	0.88	2
	Phosphorus, unfiltered (as P)	0.02	--	--	--	--	1
	Boron	30.0	--	--	--	--	1
Bighorn aquifer (springs)	Iron, unfiltered	30.0	--	--	--	--	1
	pH (standard units)	7.8	7.8	8.0	8.1	8.1	8
	Specific conductance ($\mu\text{S}/\text{cm}$)	245	--	--	--	281	2
	Hardness (as CaCO_3)	145	--	--	--	150	2
	Calcium	30.3	32.3	35.0	39.8	46.7	8
	Magnesium	6.8	11.6	14.0	17.9	22.9	8
	Sodium	0.46	0.51	0.60	1.2	1.4	7
	Potassium	0.16	0.29	0.43	1.0	1.4	8
	Sodium adsorption ratio (unitless)	0.01	0.01	0.02	0.02	0.05	8
	Alkalinity (as CaCO_3)	104	116	137	157	177	8
	Chloride	0.21	0.21	0.25	0.44	1.3	8
	Fluoride	0.20	--	--	--	--	1
	Silica	0.89	1.4	3.1	5.8	7.4	4
	Sulfate	1.8	6.6	11.2	25.8	41.2	8
	Total dissolved solids	104	135	160	176	188	8
	Ammonia (as N)	--	--	--	--	<0.10	3
	Nitrate plus nitrite (as N)	0.11	--	0.11	--	0.15	3
	Nitrate (as N)	0.50	--	--	--	--	1
	Phosphorus, unfiltered (as P)	0.01	--	0.02	--	0.02	3
	Arsenic	1.0	--	2.0	--	2.0	3
	Barium	<100	--	--	--	--	1
	Cadmium	<10.0	--	--	--	--	1
	Chromium	<50.0	--	--	--	--	1
	Copper	--	--	--	--	<10.0	2
	Iron	30.0	--	40.0	--	50.0	3
	Lead	50.0	--	50.0	--	50.0	3
	Manganese	10.0	--	10.0	--	10.0	3
	Mercury	<1.0	--	--	--	--	1
	Selenium	<1.0	--	--	--	--	1
	Zinc	<10.0	--	--	--	20.0	2
	Gross alpha radioactivity (picocuries per liter)	5.0	--	--	--	--	1
	Gross beta radioactivity (picocuries per liter)	7.1	--	--	--	--	1
	Radium-226 (picocuries per liter)	2.7	--	--	--	--	1

Appendix E-5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Bighorn aquifer (springs)—Continued	Radium-228 (picocuries per liter)	1.0	--	--	--	--	1
Gallatin aquifer and confining unit (springs)	pH (standard units)	7.7	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	340	--	--	--	--	1
	Hardness (as CaCO_3)	200	--	--	--	--	1
	Calcium	51.0	--	--	--	--	1
	Magnesium	18.0	--	--	--	--	1
	Sodium	0.90	--	--	--	--	1
	Potassium	0.50	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.01	--	--	--	--	1
	Alkalinity (as CaCO_3)	206	--	--	--	--	1
	Chloride	1.5	--	--	--	--	1
	Fluoride	0.10	--	--	--	--	1
	Silica	5.4	--	--	--	--	1
	Sulfate	1.3	--	--	--	--	1
	Total dissolved solids	203	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.24	--	--	--	--	1
	Boron	30.0	--	--	--	--	1
	Iron, unfiltered	10.0	--	--	--	--	1
Gros Ventre aquifer and confining unit (springs)	pH (standard units)	7.9	--	--	--	8.3	2
	Specific conductance ($\mu\text{S}/\text{cm}$)	264	--	--	--	296	2
	Hardness (as CaCO_3)	156	--	--	--	158	2
	Calcium	36.0	--	--	--	40.0	2
	Magnesium	14.0	--	--	--	16.0	2
	Sodium	0.40	--	--	--	1.0	2
	Potassium	0.30	--	--	--	1.0	2
	Sodium adsorption ratio (unitless)	0.01	--	--	--	0.03	2
	Alkalinity (as CaCO_3)	143	--	--	--	162	2
	Chloride	0.40	--	--	--	1.0	2
	Fluoride	0.10	--	--	--	0.10	2
	Silica	3.5	--	--	--	--	1
	Sulfate	1.5	--	--	--	2.0	2
	Total dissolved solids	102	--	--	--	152	2
	Ammonia (as N)	--	--	--	--	<0.10	2
	Nitrate plus nitrite (as N)	0.13	--	--	--	0.17	2
	Phosphorus, unfiltered (as P)	--	--	--	--	<0.01	2
	Arsenic	<2.0	--	--	--	2.0	2
	Copper	--	--	--	--	<10.0	2

Appendix E–5. Summary statistics for water samples, Overthrust Belt, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Gros Ventre aquifer and confining unit (springs)— Continued	Iron	--	--	--	--	<30.0	2
	Lead	--	--	--	--	<50.0	2
	Manganese	--	--	--	--	<10.0	2
	Zinc	--	--	--	--	<10.0	2

Appendix E-6

*Statistics for water samples, Star
Valley, Wyoming*

Appendix E–6. Summary statistics for water samples, Star Valley, Wyoming.

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary alluvial aquifers (wells)	pH (standard units)	7.2	7.5	7.6	7.8	8.3	81
	Specific conductance ($\mu\text{S}/\text{cm}$)	275	412	475	556	1,380	83
	Hardness (as CaCO_3)	117	220	235	267	334	47
	Calcium	34.0	55.0	62.0	76.0	99.0	47
	Magnesium	7.9	16.0	20.0	21.0	36.0	47
	Sodium	0.90	2.1	3.0	13.0	110	47
	Potassium	0.40	0.70	1.0	1.2	7.3	47
	Sodium adsorption ratio (unitless)	0.01	0.06	0.10	0.33	3.3	47
	Alkalinity (as CaCO_3)	110	168	207	240	309	47
	Chloride	0.40	1.3	2.7	10.0	197	46
	Fluoride	0.10	0.10	0.20	0.20	1.9	36
	Silica	4.9	7.9	9.2	11.0	47.0	34
	Sulfate	5.0	26.0	37.0	48.0	79.0	47
	Total dissolved solids	198	236	262	316	589	47
	Ammonia (as N)	--	0.004	0.01	0.03	1.2	40
	Nitrate plus nitrite (as N)	--	0.66	1.6	3.7	14.0	51
	Nitrate (as N)	--	0.64	1.6	3.2	14.0	38
	Nitrite (as N)	--	0.003	0.006	0.009	0.03	39
	Orthophosphate (as P)	--	0.006	0.01	0.02	0.11	38
	Phosphorus, unfiltered (as P)	--	0.009	0.02	0.04	0.04	4
	Aluminum	<100	--	--	--	--	1
	Antimony	<1.0	--	--	--	--	1
	Arsenic	--	--	--	--	<5.0	3
	Barium	<100	--	--	--	--	1
	Beryllium	<4.0	--	--	--	--	1
	Boron	--	13.1	20.3	31.4	80.0	26
	Cadmium	<0.50	--	--	--	--	1
	Chromium	<50.0	--	--	--	--	1
	Copper	--	--	--	--	<10.0	3
	Iron	--	0.33	1.7	8.2	610	14
	Iron, unfiltered	--	10.0	15.0	20.0	20.0	8
	Lead	--	--	--	--	<50.0	3
	Manganese	--	--	--	--	<20.0	14
	Mercury	<0.50	--	--	--	--	1
	Nickel	<20.0	--	--	--	--	1
	Selenium	--	--	--	--	<5.0	3
	Zinc	--	--	--	--	<10.0	3
	Gross alpha radioactivity (picocuries per liter)	<3.0	--	--	--	--	1

Appendix E-6. Summary statistics for water samples, Star Valley, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Quaternary alluvial aquifers (wells)—Continued	Gross beta radioactivity (picocuries per liter)	2.7	--	--	--	--	1
	Radium-226 (picocuries per liter)	<0.20	--	--	--	--	1
	Radium-228 (picocuries per liter)	<1.0	--	--	--	--	1
	Radon-222, unfiltered (picocuries per liter)	320	430	555	690	850	6
	Uranium	1.0	--	--	--	--	1
Quaternary terrace-deposit aquifers (wells)	pH (standard units)	7.8	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	383	--	--	--	450	2
	Hardness (as CaCO_3)	196	--	--	--	--	1
	Calcium	49.0	--	--	--	--	1
	Magnesium	18.0	--	--	--	--	1
	Sodium	1.2	--	--	--	--	1
	Potassium	0.60	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.04	--	--	--	--	1
	Alkalinity (as CaCO_3)	188	--	--	--	--	1
	Chloride	1.2	--	--	--	--	1
	Fluoride	0.10	--	--	--	--	1
	Silica	7.2	--	--	--	--	1
	Sulfate	17.0	--	--	--	--	1
	Total dissolved solids	206	--	--	--	--	1
	Ammonia (as N)	<0.01	--	--	--	0.02	2
	Nitrate plus nitrite (as N)	0.68	--	--	--	0.82	2
	Nitrate (as N)	0.66	--	--	--	0.81	2
	Nitrite (as N)	0.01	--	--	--	0.02	2
	Orthophosphate (as P)	0.01	--	--	--	0.03	2
	Boron	<10.0	--	--	--	--	1
	Iron	<3.0	--	--	--	--	1
	Manganese	<1.0	--	--	--	--	1
Salt Lake aquifer (springs)	pH (standard units)	7.4	7.5	7.6	7.9	8.0	4
	Specific conductance ($\mu\text{S}/\text{cm}$)	290	338	390	444	494	4
	Hardness (as CaCO_3)	206	--	--	--	270	2
	Calcium	53.0	--	--	--	75.0	2
	Magnesium	18.0	--	--	--	21.0	2
	Sodium	1.0	--	--	--	2.9	2
	Potassium	0.70	--	--	--	0.80	2
	Sodium adsorption ratio (unitless)	0.03	--	--	--	0.10	2
	Alkalinity (as CaCO_3)	170	--	--	--	285	2

Appendix E-6. Summary statistics for water samples, Star Valley, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Salt Lake aquifer (springs)—Continued	Chloride	2.1	--	--	--	2.4	2
	Fluoride	0.20	--	--	--	0.30	2
	Silica	10.0	--	--	--	12.0	2
	Sulfate	0.30	--	--	--	30.0	2
	Total dissolved solids	236	--	--	--	287	2
	Ammonia (as N)	--	--	--	--	<0.10	2
	Nitrate plus nitrite (as N)	0.20	--	1.0	--	1.6	3
	Nitrate (as N)	0.99	--	--	--	4.4	2
	Nitrite (as N)	0.01	--	--	--	--	1
	Orthophosphate (as P)	0.01	--	--	--	--	1
	Phosphorus, unfiltered (as P)	0.01	--	--	--	--	1
	Arsenic	3.0	--	--	--	--	1
	Boron	30.0	--	--	--	--	1
	Copper	<10.0	--	--	--	--	1
	Iron	<30.0	--	--	--	--	1
	Iron, unfiltered	20.0	--	--	--	--	1
	Lead	<50.0	--	--	--	--	1
	Manganese	<10.0	--	--	--	--	1
	Zinc	<10.0	--	--	--	--	1
Salt Lake aquifer (wells)	pH (standard units)	7.0	7.4	7.6	7.8	8.4	21
	Specific conductance ($\mu\text{S}/\text{cm}$)	233	447	506	547	839	21
	Hardness (as CaCO_3)	130	236	250	303	360	17
	Calcium	38.0	62.0	71.9	80.0	88.0	17
	Magnesium	6.6	19.0	22.0	26.0	36.0	17
	Sodium	0.80	2.0	3.2	8.1	42.0	18
	Potassium	0.70	0.80	1.0	2.0	4.3	17
	Sodium adsorption ratio (unitless)	0.03	0.07	0.10	0.20	1.6	17
	Alkalinity (as CaCO_3)	145	215	225	277	318	17
	Chloride	1.0	2.0	4.0	6.2	25.0	17
	Fluoride	0.05	0.10	0.10	0.20	0.49	17
	Silica	4.0	7.1	9.9	15.0	20.0	9
	Sulfate	2.8	9.0	17.0	32.0	64.0	18
	Total dissolved solids	141	252	270	315	347	17
	Ammonia (as N)	<0.10	--	--	--	0.16	11
	Nitrate plus nitrite (as N)	--	0.20	1.1	2.4	5.5	16
	Nitrate (as N)	<0.01	--	--	--	0.20	4
	Nitrite (as N)	--	--	--	--	<0.10	4
	Orthophosphate (as P)	<0.01	--	--	--	0.02	2
	Phosphorus, unfiltered (as P)	--	0.02	0.02	0.03	0.13	9
	Aluminum	<100	--	--	--	--	1

Appendix E-6. Summary statistics for water samples, Star Valley, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Salt Lake aquifer (wells)—Continued	Antimony	--	--	--	--	<1.0	2
	Arsenic	--	0.81	0.99	1.2	2.0	11
	Barium	--	--	--	--	<500	3
	Beryllium	--	--	--	--	<1.0	2
	Boron	--	16.6	36.1	150	160	7
	Cadmium	--	--	--	--	<2.0	3
	Chromium	--	--	--	--	<50.0	3
	Copper	--	3.4	6.8	10.0	40.0	11
	Iron	--	7.1	41.6	220	7,030	11
	Iron, unfiltered	--	15.8	38.9	40.0	1,780	5
	Lead	--	--	--	--	<50.0	11
	Manganese	<10.0	--	--	--	140	11
	Manganese, unfiltered	<10.0	--	--	--	140	2
	Mercury	--	--	--	--	<1.0	3
	Nickel	--	--	--	--	<50.0	2
	Selenium	--	--	--	--	<5.0	3
	Zinc	--	4.2	14.7	40.0	110	10
	Gross alpha radioactivity (picocuries per liter)	--	0.85	1.5	3.5	5.0	4
	Gross beta radioactivity (picocuries per liter)	--	1.6	4.3	10.4	15	4
	Radium-226 (picocuries per liter)	--	0.40	0.75	3.0	5.0	4
	Radium-228 (picocuries per liter)	--	0.70	3.0	5.8	6.6	4
	Radon-222, unfiltered (picocuries per liter)	620	--	--	--	--	1
	Uranium	--	0.65	2.0	4.0	5.0	4
Twin Creek aquifer (springs)	pH (standard units)	7.5	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	899	--	--	--	--	1
	Hardness (as CaCO_3)	505	--	--	--	--	1
	Calcium	150	--	--	--	--	1
	Magnesium	32.0	--	--	--	--	1
	Sodium	5.0	--	--	--	--	1
	Potassium	1.0	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.10	--	--	--	--	1
	Alkalinity (as CaCO_3)	196	--	--	--	--	1
	Chloride	1.0	--	--	--	--	1
	Fluoride	0.10	--	--	--	--	1
	Sulfate	318	--	--	--	--	1
	Total dissolved solids	614	--	--	--	--	1

Appendix E-6. Summary statistics for water samples, Star Valley, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Twin Creek aquifer (springs)— Continued	Ammonia (as N)	<0.10	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.23	--	--	--	--	1
	Phosphorus, unfiltered (as P)	0.02	--	--	--	--	1
	Arsenic	<1.0	--	--	--	--	1
	Copper	60.0	--	--	--	--	1
	Iron	<30.0	--	--	--	--	1
	Lead	<50.0	--	--	--	--	1
Thaynes aquifer (wells)	Manganese	<10.0	--	--	--	--	1
	Zinc	30.0	--	--	--	--	1
	pH (standard units)	7.6	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	409	--	--	--	9,840	2
	Radon-222, unfiltered (picocuries per liter)	150	--	--	--	--	1
	pH (standard units)	7.5	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	444	--	--	--	--	1
Dinwoody aquifer and confining unit (hot springs)	pH (standard units)	7.5	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	6,800	--	--	--	--	1
	Hardness (as CaCO_3)	1,300	--	--	--	--	1
	Calcium	400	--	--	--	--	1
	Magnesium	70.0	--	--	--	--	1
	Sodium	1,400	--	--	--	--	1
	Potassium	140	--	--	--	--	1
	Sodium adsorption ratio (unitless)	17.0	--	--	--	--	1
	Alkalinity (as CaCO_3)	860	--	--	--	--	1
	Chloride	1,700	--	--	--	--	1
	Fluoride	0.60	--	--	--	--	1
	Silica	35.0	--	--	--	--	1
	Sulfate	1,100	--	--	--	--	1
	Total dissolved solids	5,250	--	--	--	--	1
	Arsenic	<50.0	--	--	--	--	1
	Barium	<500	--	--	--	--	1
	Boron	2,150	--	--	--	--	1
	Cadmium	<10.0	--	--	--	--	1
	Chromium	<100	--	--	--	--	1
	Copper	<10.0	--	--	--	--	1
	Lead	500	--	--	--	--	1
	Manganese	<50.0	--	--	--	--	1
	Mercury	<1.0	--	--	--	--	1
	Nickel	<100	--	--	--	--	1

Appendix E-6. Summary statistics for water samples, Star Valley, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Dinwoody aquifer and confining unit (hot springs)—Continued	Selenium	<1.0	--	--	--	--	1
	Zinc	340	--	--	--	--	1
Madison aquifer (wells)	pH (standard units)	7.6	7.6	7.7	7.8	7.9	4
	Specific conductance ($\mu\text{S}/\text{cm}$)	489	519	563	585	592	4
	Hardness (as CaCO_3)	272	292	315	328	338	4
	Calcium	67.0	70.0	73.5	76.0	78.0	4
	Magnesium	22.0	26.0	32.5	36.0	37.0	4
	Sodium	1.7	4.0	5.0	7.0	7.0	5
	Potassium	0.80	0.90	1.0	1.0	1.0	4
	Sodium adsorption ratio (unitless)	0.04	0.07	0.11	0.14	0.17	4
	Alkalinity (as CaCO_3)	254	254	266	304	330	4
	Chloride	5.3	5.7	6.5	8.5	10.0	4
	Fluoride	0.30	0.30	0.30	0.30	0.30	5
	Silica	4.6	--	--	--	--	1
	Sulfate	10.0	31.0	33.0	33.0	37.0	5
	Total dissolved solids	244	277	311	331	349	4
	Ammonia (as N)	--	--	--	--	<0.10	3
	Nitrate plus nitrite (as N)	--	0.34	1.5	1.5	1.6	5
	Nitrate (as N)	0.34	--	--	--	--	1
	Nitrite (as N)	--	--	--	--	<0.10	3
	Orthophosphate (as P)	<0.01	--	--	--	--	1
	Phosphorus, unfiltered (as P)	0.01	--	--	--	0.02	2
	Aluminum	<100	--	--	--	--	1
	Antimony	--	--	--	--	<1.0	3
	Arsenic	--	1.1	1.3	1.5	2.0	5
	Barium	200	--	200	--	300	3
	Beryllium	--	--	--	--	<1.0	3
	Boron	<100	--	--	--	--	1
	Cadmium	--	--	--	--	<1.0	3
	Chromium	--	--	--	--	<5.00	3
	Copper	--	6.8	10.0	20.0	120	5
	Iron	<30.0	--	--	--	41.0	3
	Lead	--	--	--	--	<50.0	4
	Manganese	--	--	--	--	<10.0	3
	Mercury	--	--	--	--	<1.0	3
	Nickel	--	--	--	--	<50.0	3
	Selenium	--	--	--	--	<5.0	3
	Zinc	10.0	--	40.0	--	145	3

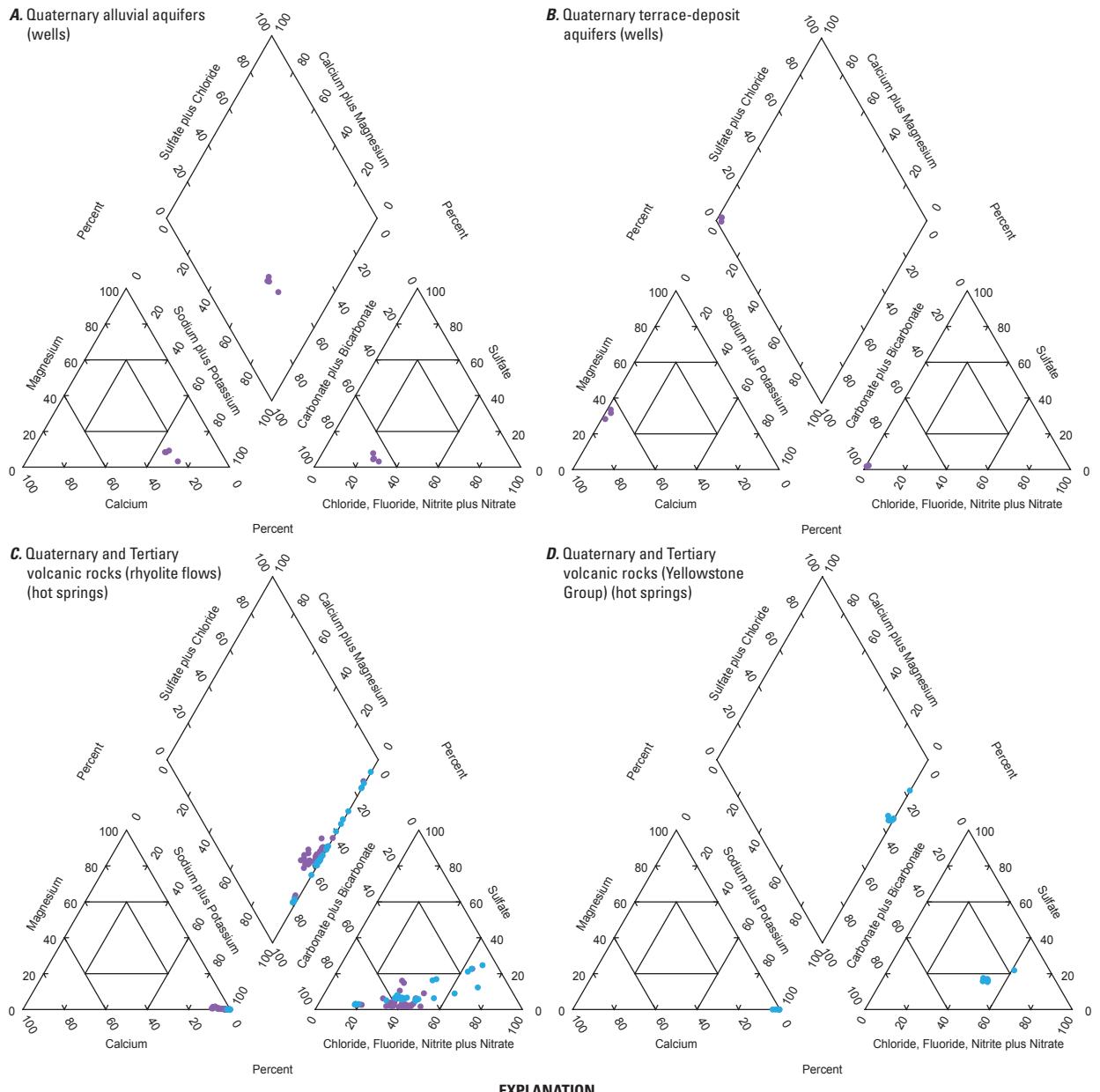
Appendix E-6. Summary statistics for water samples, Star Valley, Wyoming.—Continued

[--, not applicable; <, less than; Values in black are in milligrams per liter unless otherwise noted; values in blue are in micrograms per liter; $\mu\text{S}/\text{cm}$, microsiemens per centimeter at 25 degrees Celsius; CaCO_3 , calcium carbonate; N, nitrogen; P, phosphorus]

Hydrogeologic unit	Characteristic or constituent	Minimum	25th percentile	Median	75th percentile	Maximum	Sample size
Madison aquifer (wells)—Continued	Gross alpha radioactivity (picocuries per liter)	3.9	--	5.3	--	6.5	3
	Gross beta radioactivity (picocuries per liter)	0.20	--	--	--	--	1
	Radium-226 (picocuries per liter)	0.30	--	--	--	0.30	2
	Radium-228 (picocuries per liter)	0.30	--	0.50	--	0.80	3
	Radon-222, unfiltered (picocuries per liter)	230	--	--	--	--	1
	Uranium	0.40	--	--	--	0.70	2
Paleozoic limestone underlying the Salt Lake Formation (wells)	pH (standard units)	8.0	--	--	--	--	1
	Specific conductance ($\mu\text{S}/\text{cm}$)	326	--	--	--	--	1
	Hardness (as CaCO_3)	186	--	--	--	--	1
	Calcium	37.0	--	--	--	--	1
	Magnesium	23.0	--	--	--	--	1
	Sodium	0.80	--	--	--	1.0	2
	Potassium	1.0	--	--	--	--	1
	Sodium adsorption ratio (unitless)	0.03	--	--	--	--	1
	Alkalinity (as CaCO_3)	169	--	--	--	--	1
	Chloride	1.0	--	--	--	--	1
	Fluoride	0.10	--	--	--	0.10	2
	Sulfate	7.0	--	--	--	13.0	2
	Total dissolved solids	169	--	--	--	--	1
	Ammonia (as N)	<0.10	--	--	--	--	1
	Nitrate plus nitrite (as N)	0.20	--	--	--	0.40	2
	Nitrite (as N)	<0.10	--	--	--	--	1
	Phosphorus, unfiltered (as P)	0.02	--	--	--	--	1
	Antimony	<1.0	--	--	--	--	1
	Arsenic	--	--	--	--	<5.0	2
	Barium	<100	--	--	--	--	1
	Beryllium	<0.50	--	--	--	--	1
	Cadmium	<0.50	--	--	--	--	1
	Chromium	<50.0	--	--	--	--	1
	Copper	--	--	--	--	<10.0	2
	Iron	<30.0	--	--	--	--	1
	Lead	--	--	--	--	<50.0	2
	Manganese	<10.0	--	--	--	--	1
	Mercury	<0.50	--	--	--	--	1
	Nickel	<20.0	--	--	--	--	1
	Selenium	<5.0	--	--	--	--	1
	Zinc	40.0	--	--	--	--	1

Appendix F-1

*Trilinear diagrams showing
major-ion composition and
dissolved-solids for groundwater
samples, Yellowstone Volcanic
Area, Wyoming*



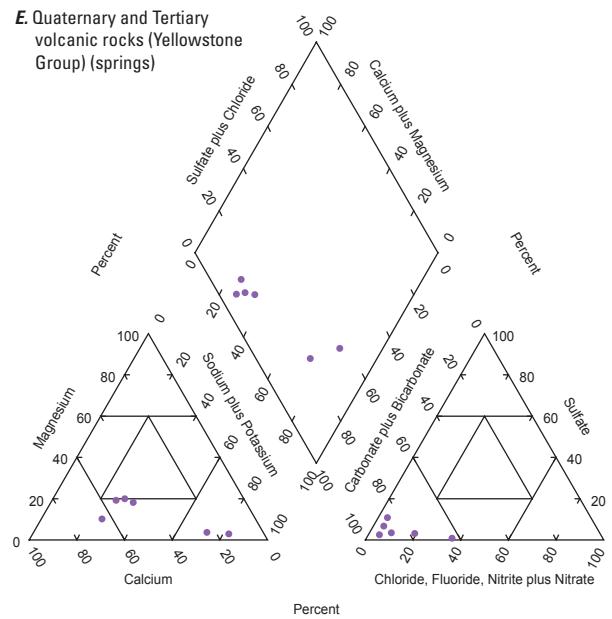
EXPLANATION

Total dissolved-solids concentration, in milligrams per liter,
and U.S. Geological Survey salinity classification (Heath, 1983)

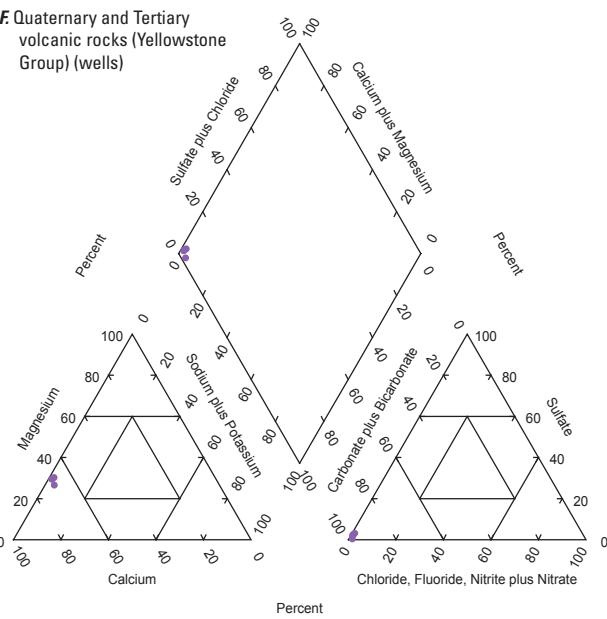
- Less than or equal to 999; fresh
- 1,000–2,999; slightly saline
- 3,000–9,999; moderately saline
- 10,000–34,999; very saline
- Greater than or equal to 35,000; briny

Appendix F-1. Trilinear diagrams showing major-ion composition and dissolved-solids concentrations for groundwater samples from wells and springs in the Yellowstone Volcanic Area, Wyoming.

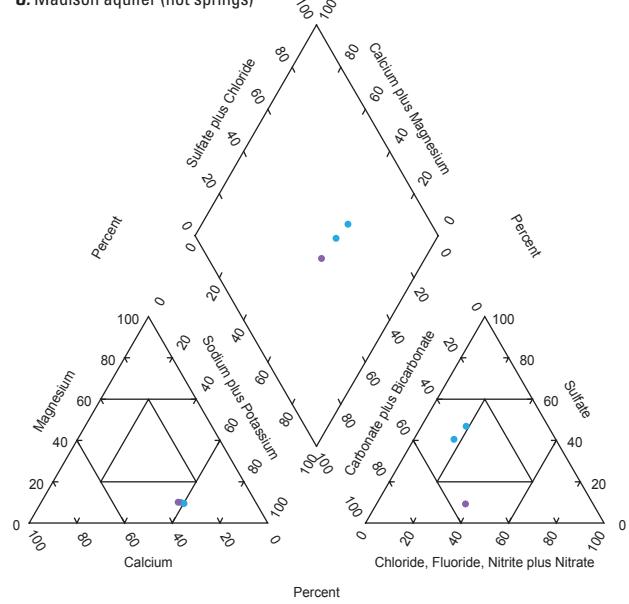
E. Quaternary and Tertiary volcanic rocks (Yellowstone Group) (springs)



F. Quaternary and Tertiary volcanic rocks (Yellowstone Group) (wells)



G. Madison aquifer (hot springs)



EXPLANATION

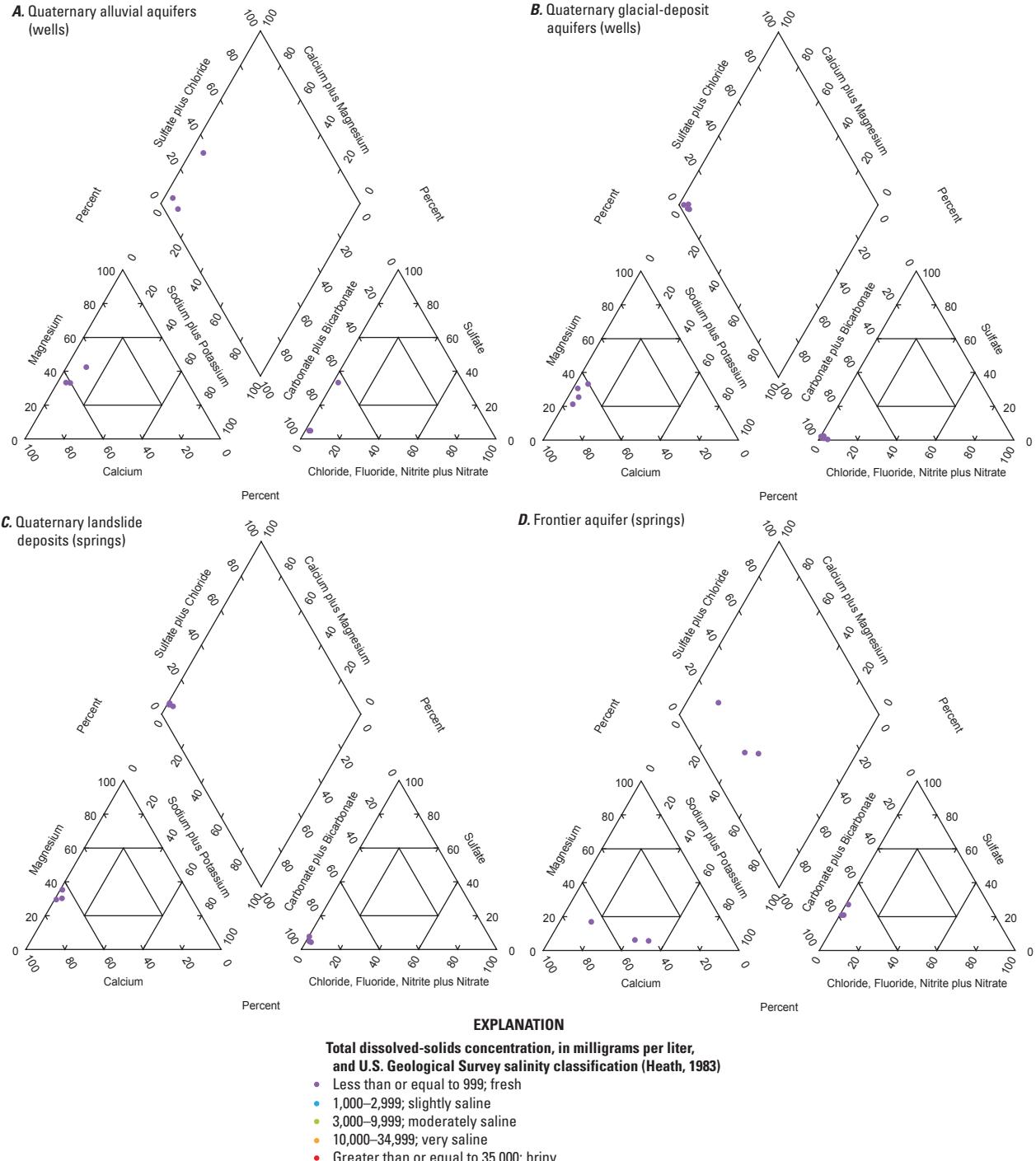
Total dissolved-solids concentration, in milligrams per liter,
and U.S. Geological Survey salinity classification (Heath, 1983)

- Less than or equal to 999; fresh
- 1,000–2,999; slightly saline
- 3,000–9,999; moderately saline
- 10,000–34,999; very saline
- Greater than or equal to 35,000; briny

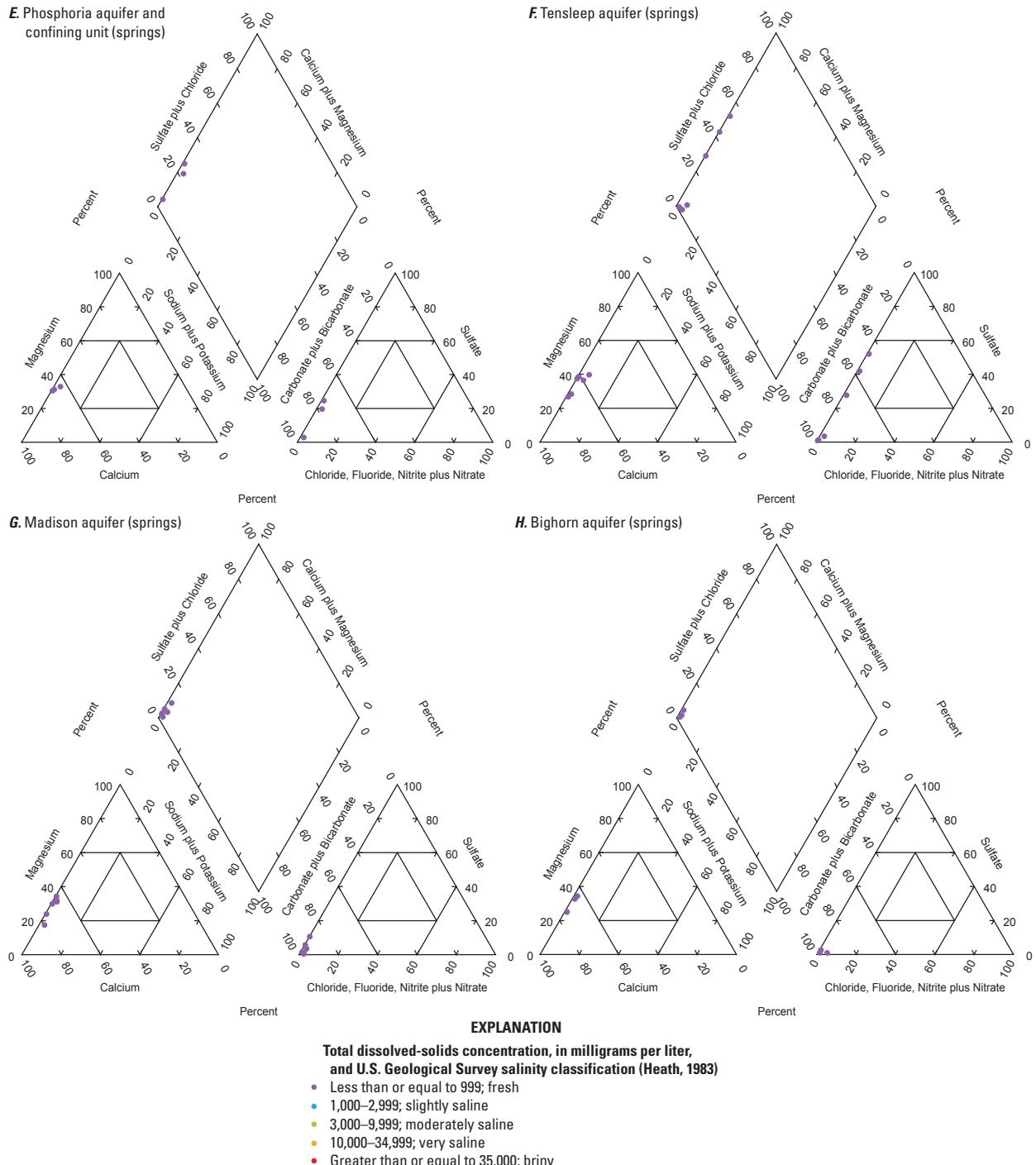
Appendix F-1. Trilinear diagrams showing major-ion composition and dissolved-solids concentrations for groundwater samples from wells and springs in the Yellowstone Volcanic Area, Wyoming.—Continued

Appendix F-2

*Trilinear diagrams showing
major-ion composition and
dissolved-solids for groundwater
samples, Northern Ranges,
Wyoming*

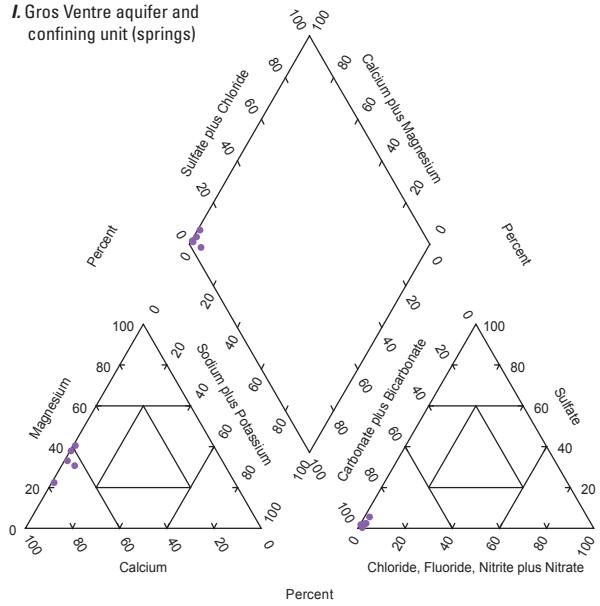


Appendix F-2. Trilinear diagrams showing major-ion composition and dissolved-solids concentrations for groundwater samples from wells and springs in the Northern Ranges, Wyoming.

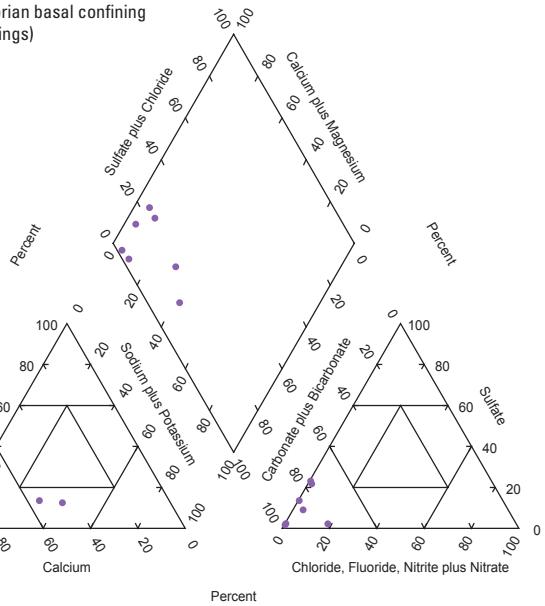


Appendix F-2. Trilinear diagrams showing major-ion composition and dissolved-solids concentrations for groundwater samples from wells and springs in the Northern Ranges, Wyoming.—Continued

I. Gros Ventre aquifer and confining unit (springs)



J. Precambrian basal confining unit (springs)



EXPLANATION

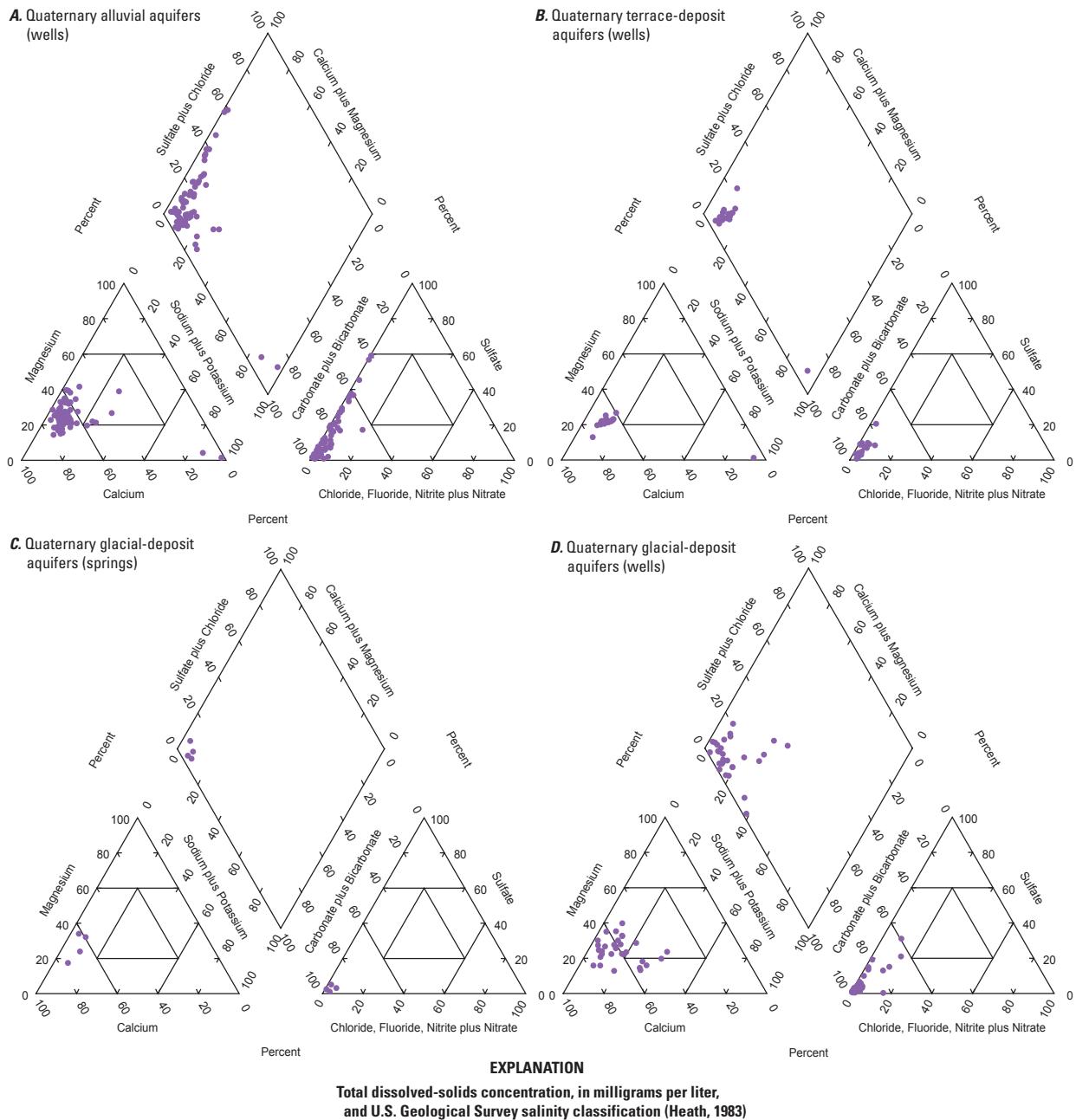
Total dissolved-solids concentration, in milligrams per liter,
and U.S. Geological Survey salinity classification (Heath, 1983)

- Less than or equal to 999; fresh
- 1,000–2,999; slightly saline
- 3,000–9,999; moderately saline
- 10,000–34,999; very saline
- Greater than or equal to 35,000; briny

Appendix F-2. Trilinear diagrams showing major-ion composition and dissolved-solids concentrations for groundwater samples from wells and springs in the Northern Ranges, Wyoming.—Continued

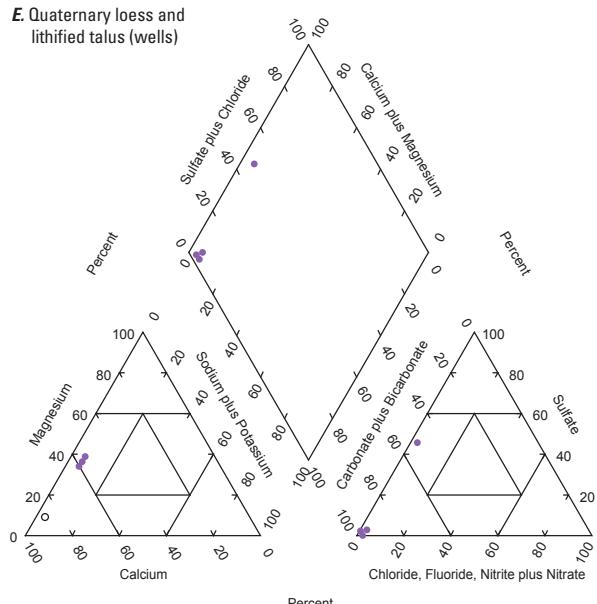
Appendix F-3

*Trilinear diagrams showing
major-ion composition and
dissolved-solids for groundwater
samples, Jackson Hole, Wyoming*

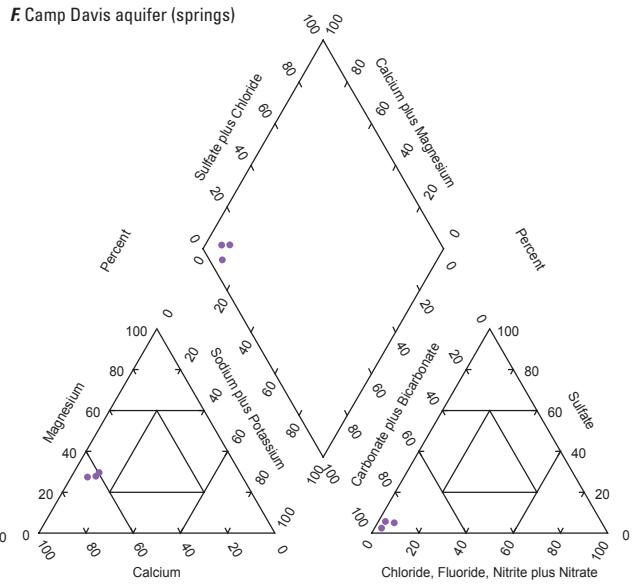


Appendix F-3. Trilinear diagrams showing major-ion composition and dissolved-solids concentrations for groundwater samples from wells and springs near Jackson Hole, Wyoming.

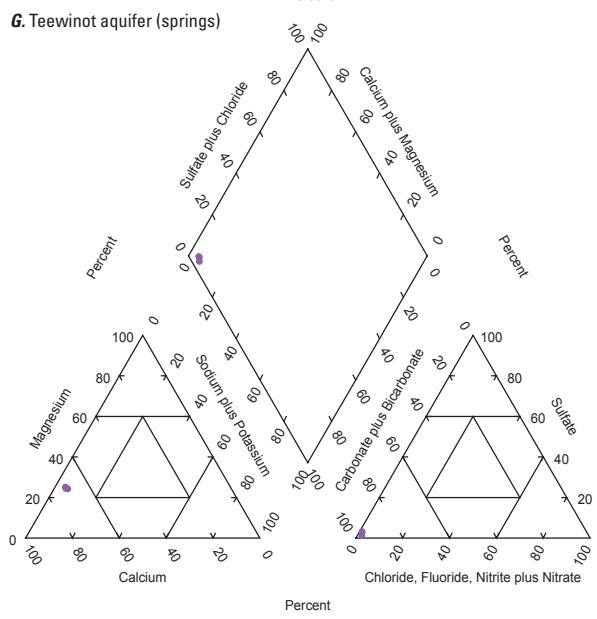
E. Quaternary loess and lithified talus (wells)



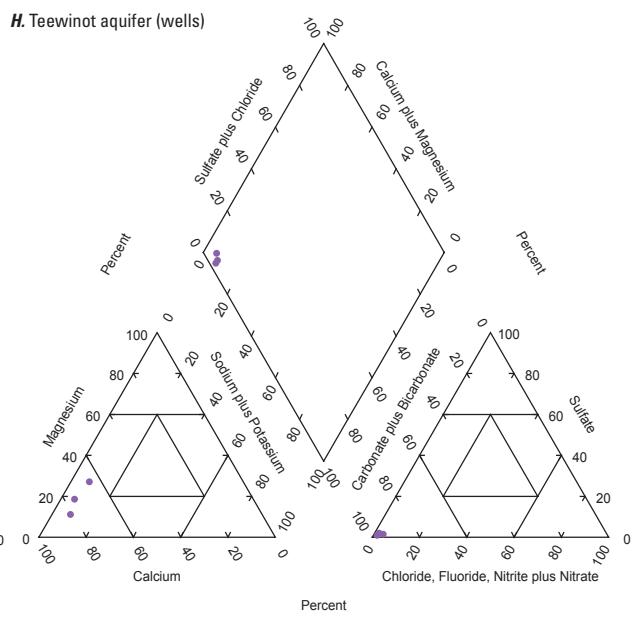
F. Camp Davis aquifer (springs)



G. Teewinot aquifer (springs)



H. Teewinot aquifer (wells)



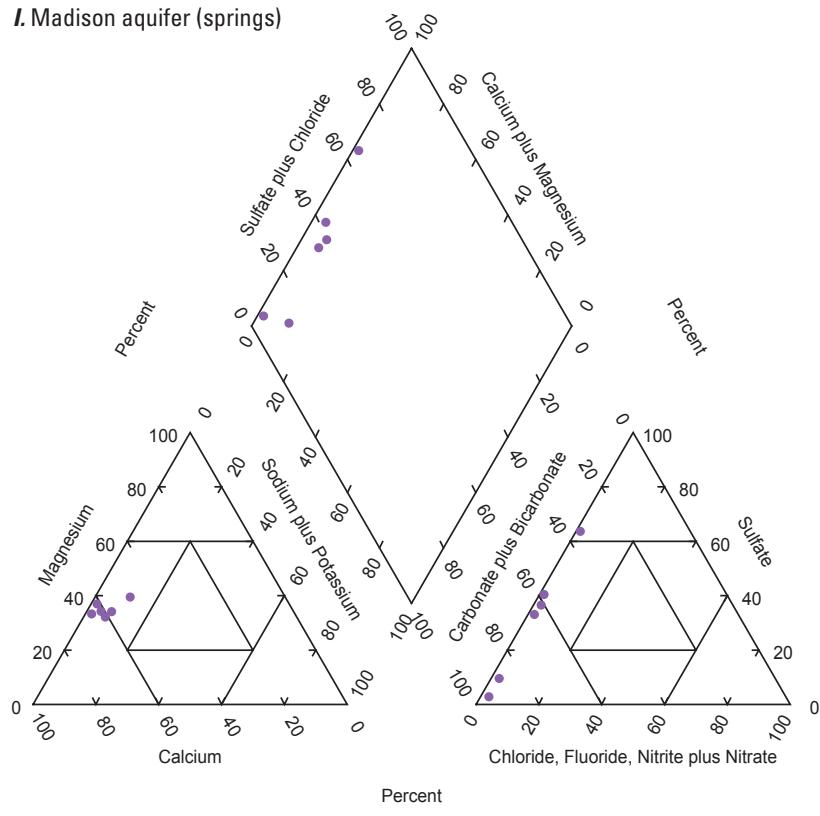
EXPLANATION

Total dissolved-solids concentration, in milligrams per liter,
and U.S. Geological Survey salinity classification (Heath, 1983)

- Less than or equal to 999; fresh
- 1,000–2,999; slightly saline
- 3,000–9,999; moderately saline
- 10,000–34,999; very saline
- Greater than or equal to 35,000; briny

Appendix F-3. Trilinear diagrams showing major-ion composition and dissolved-solids concentrations for groundwater samples from wells and springs near Jackson Hole, Wyoming.—Continued

I. Madison aquifer (springs)



EXPLANATION

**Total dissolved-solids concentration, in milligrams per liter,
and U.S. Geological Survey salinity classification (Heath, 1983)**

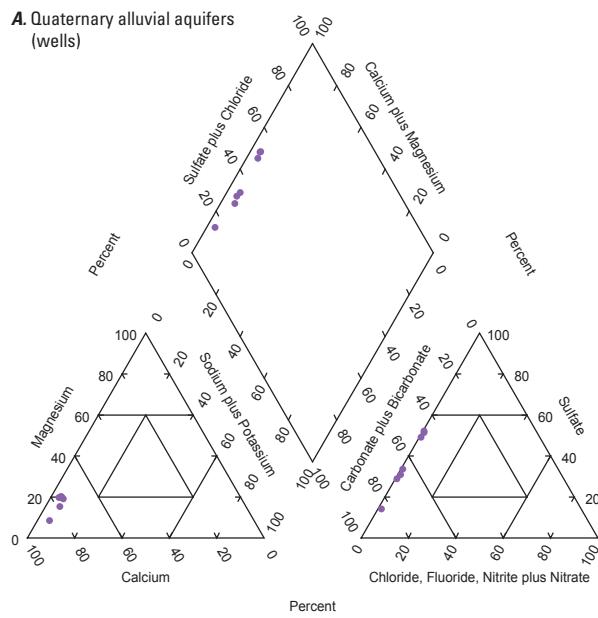
- Less than or equal to 999; fresh
- 1,000–2,999; slightly saline
- 3,000–9,999; moderately saline
- 10,000–34,999; very saline
- Greater than or equal to 35,000; briny

Appendix F-3. Trilinear diagrams showing major-ion composition and dissolved-solids concentrations for groundwater samples from wells and springs near Jackson Hole, Wyoming.—Continued

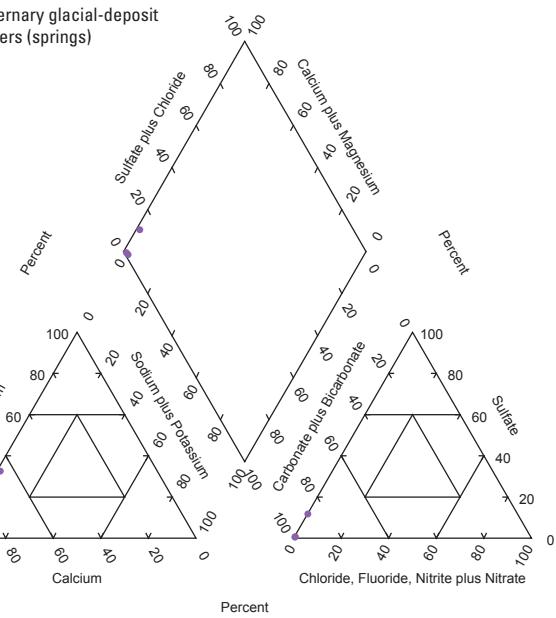
Appendix F-4

*Trilinear diagrams showing
major-ion composition and
dissolved-solids for groundwater
samples, Green River and
Hoback basins, Wyoming*

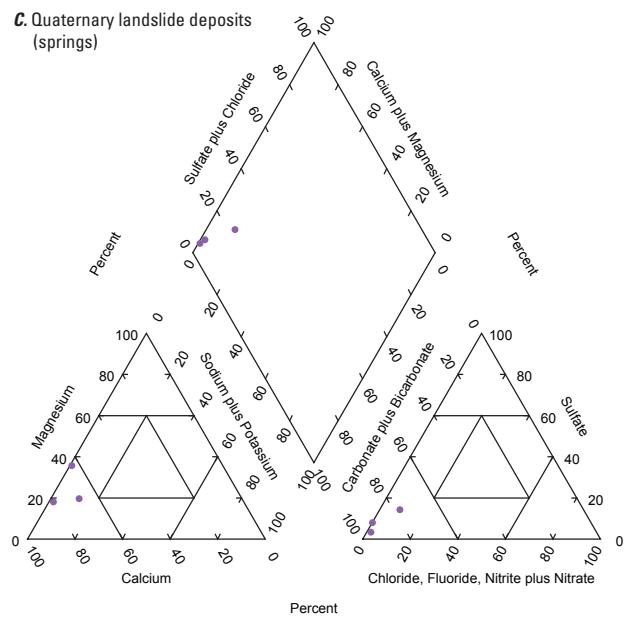
A. Quaternary alluvial aquifers (wells)



B. Quaternary glacial-deposit aquifers (springs)



C. Quaternary landslide deposits (springs)



EXPLANATION

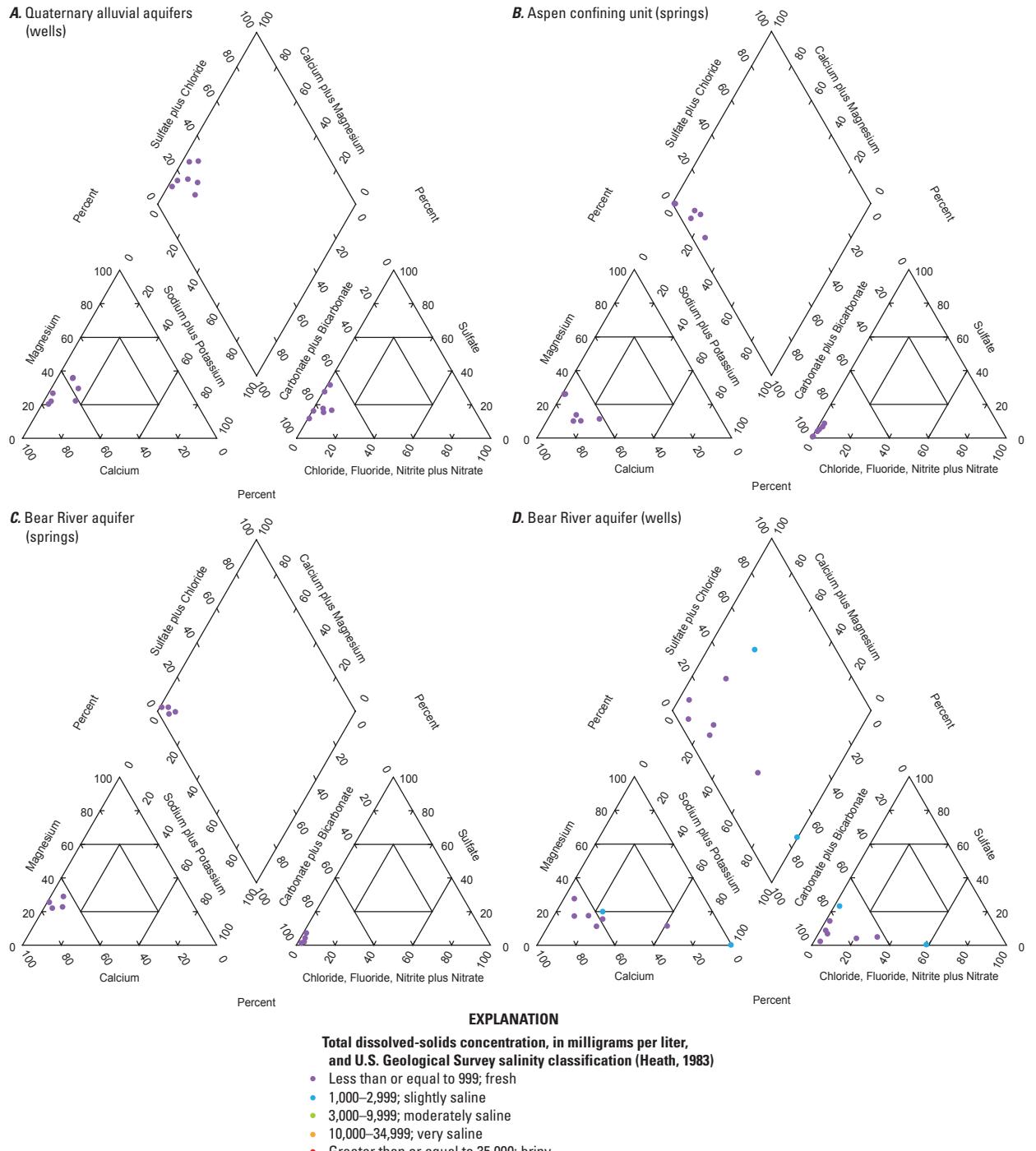
Total dissolved-solids concentration, in milligrams per liter,
and U.S. Geological Survey salinity classification (Heath, 1983)

- Less than or equal to 999; fresh
- 1,000–2,999; slightly saline
- 3,000–9,999; moderately saline
- 10,000–34,999; very saline
- Greater than or equal to 35,000; briny

Appendix F-4. Trilinear diagrams showing major-ion composition and dissolved-solids concentrations for groundwater samples from wells and springs in the Green River and Hoback Basins, Wyoming.

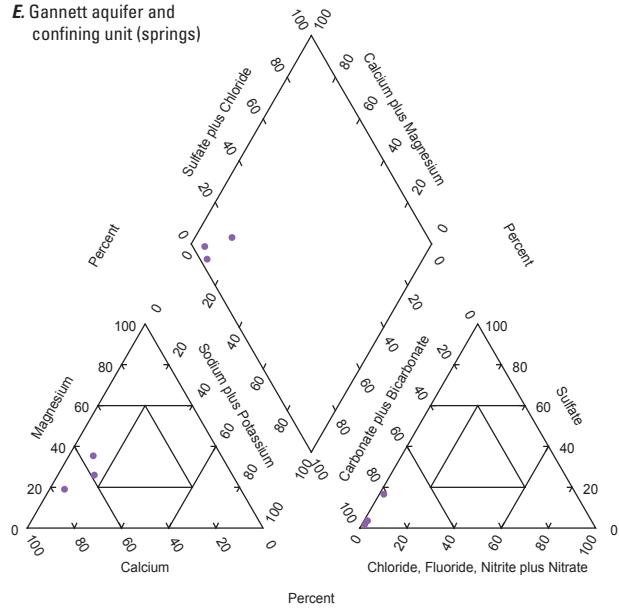
Appendix F-5

*Trilinear diagrams showing
major-ion composition and
dissolved-solids for groundwater
samples, Overthrust Belt,
Wyoming*

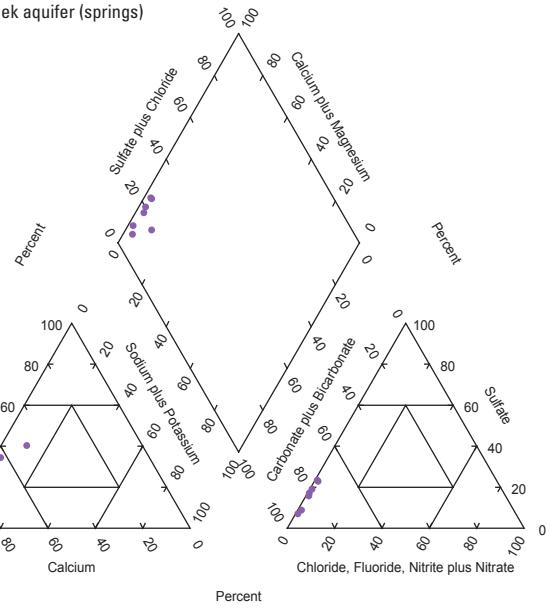


Appendix F-5. Trilinear diagrams showing major-ion composition and dissolved-solids concentrations for groundwater samples from wells and springs in the Overthrust Belt, Wyoming.

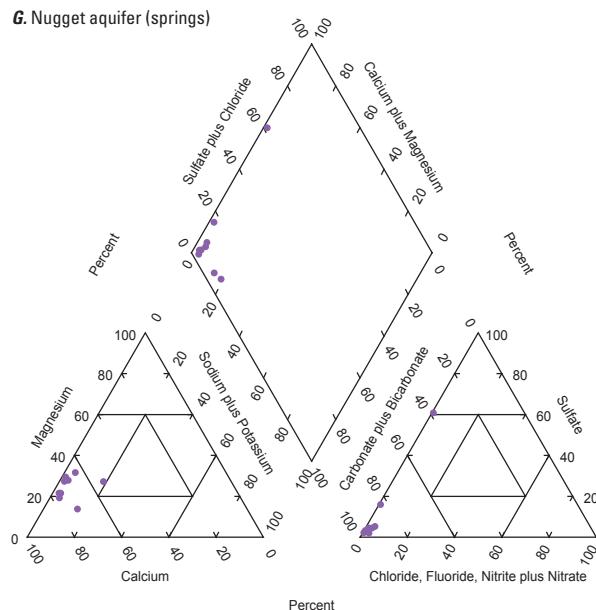
E. Gannett aquifer and confining unit (springs)



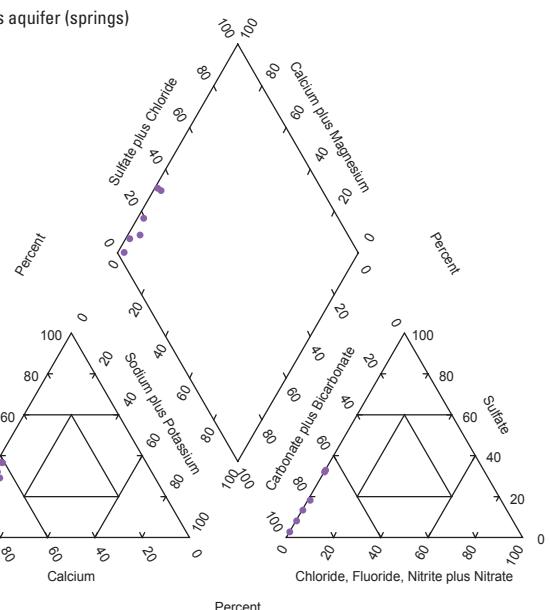
F. Twin Creek aquifer (springs)



G. Nugget aquifer (springs)



H. Thaynes aquifer



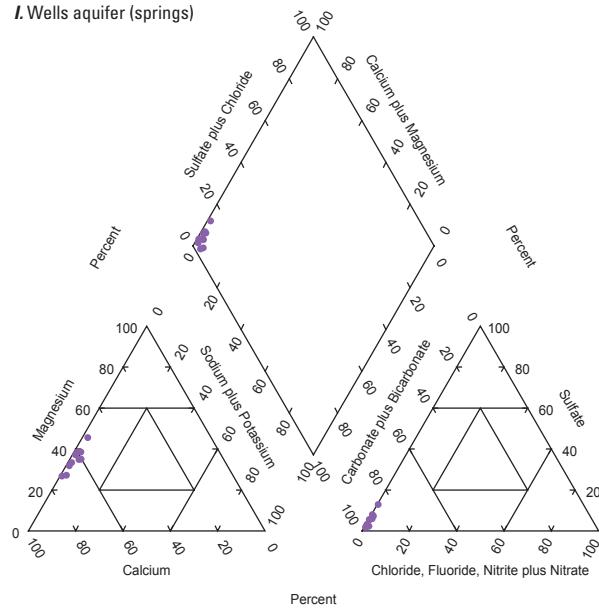
EXPLANATION

Total dissolved-solids concentration, in milligrams per liter,
and U.S. Geological Survey salinity classification (Heath, 1983)

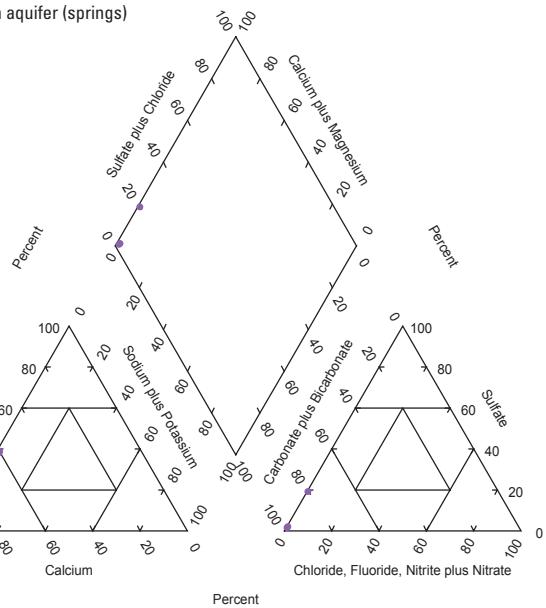
- Less than or equal to 999; fresh
- 1,000–2,999; slightly saline
- 3,000–9,999; moderately saline
- 10,000–34,999; very saline
- Greater than or equal to 35,000; briny

Appendix F-5. Trilinear diagrams showing major-ion composition and dissolved-solids concentrations for groundwater samples from wells and springs in the Overthrust Belt, Wyoming.—Continued

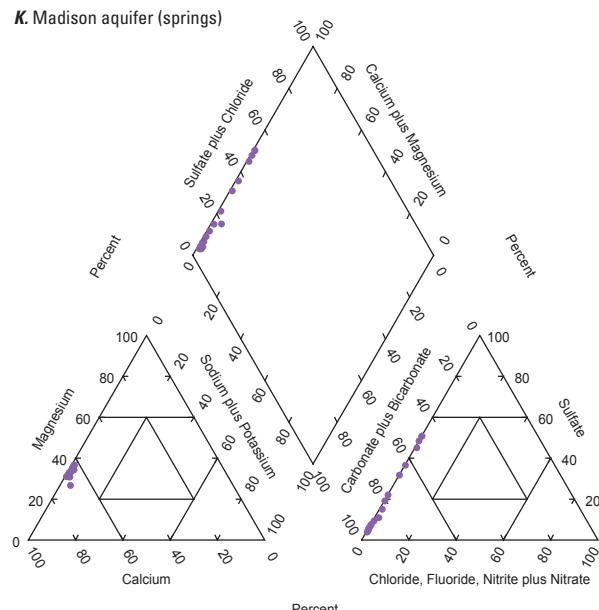
I. Wells aquifer (springs)



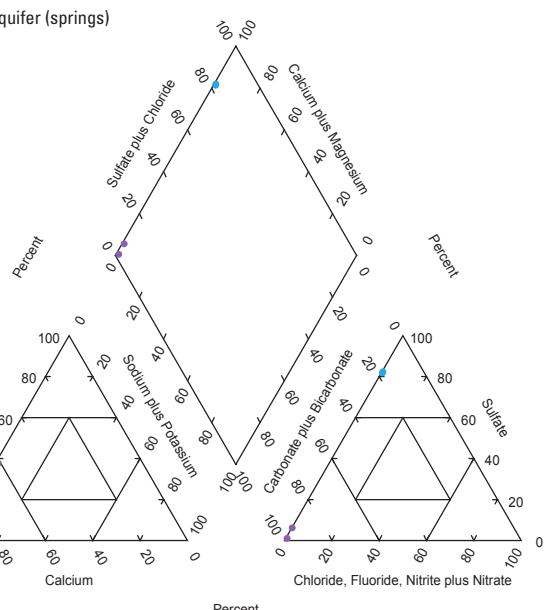
J. Amsden aquifer (springs)



K. Madison aquifer (springs)



L. Darby aquifer (springs)



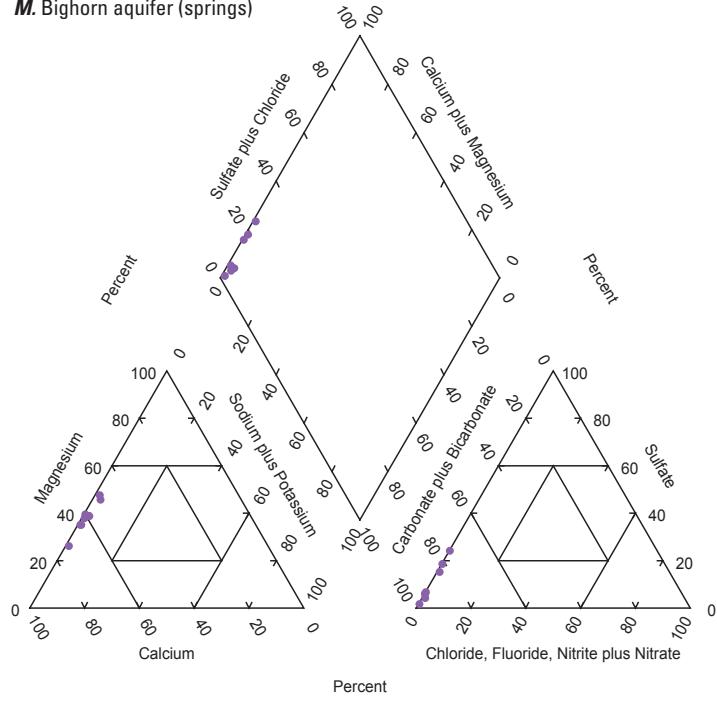
EXPLANATION

Total dissolved-solids concentration, in milligrams per liter,
and U.S. Geological Survey salinity classification (Heath, 1983)

- Less than or equal to 999; fresh
- 1,000–2,999; slightly saline
- 3,000–9,999; moderately saline
- 10,000–34,999; very saline
- Greater than or equal to 35,000; briny

Appendix F-5. Trilinear diagrams showing major-ion composition and dissolved-solids concentrations for groundwater samples from wells and springs in the Overthrust Belt, Wyoming.—Continued

M. Bighorn aquifer (springs)



EXPLANATION

Total dissolved-solids concentration, in milligrams per liter,
and U.S. Geological Survey salinity classification (Heath, 1983)

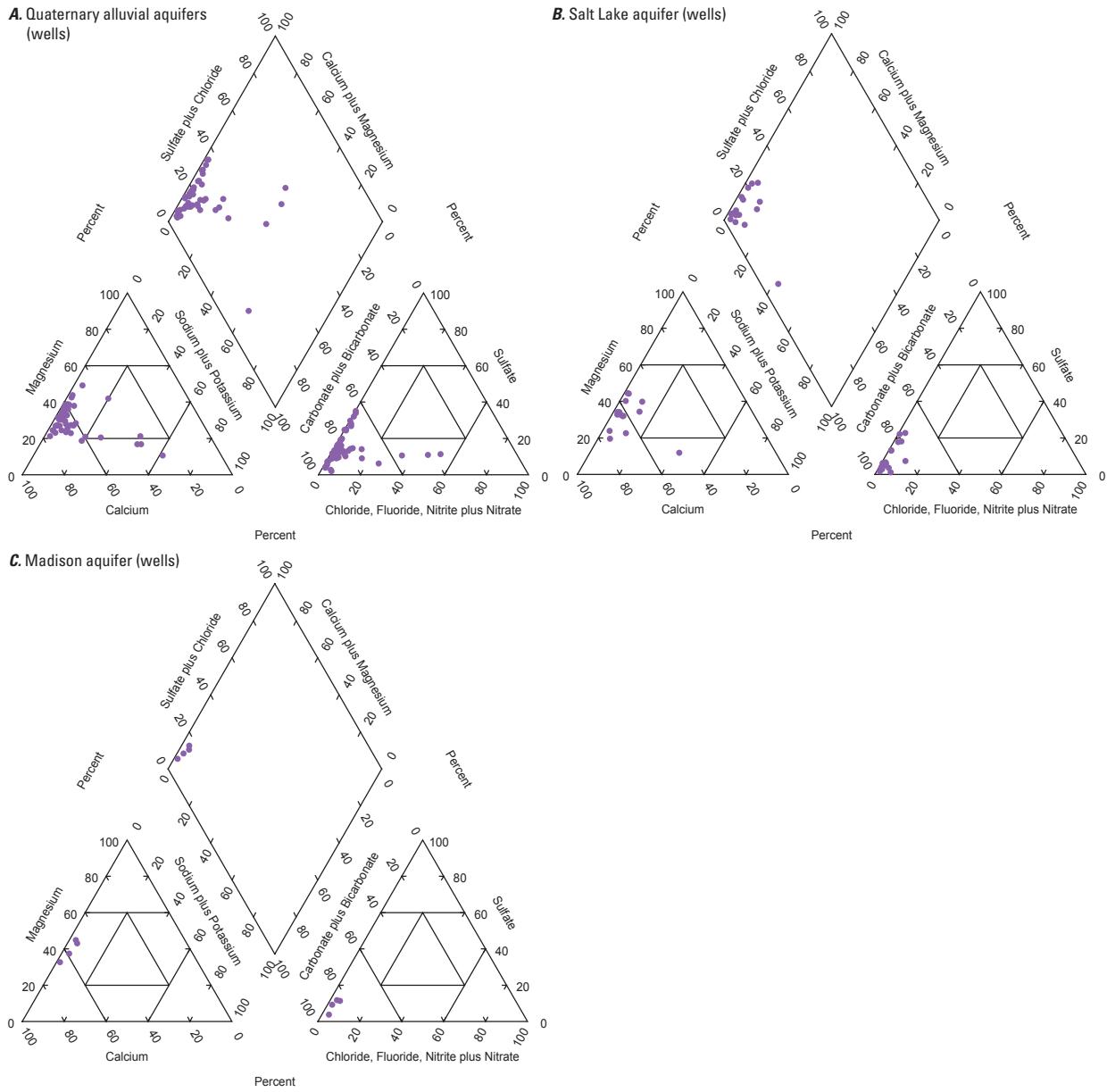
- Less than or equal to 999; fresh
- 1,000–2,999; slightly saline
- 3,000–9,999; moderately saline
- 10,000–34,999; very saline
- Greater than or equal to 35,000; briny

Appendix F-5. Trilinear diagrams showing major-ion composition and dissolved-solids concentrations for groundwater samples from wells and springs in the Overthrust Belt, Wyoming.—Continued

F-5-402

Appendix F-6

*Trilinear diagrams showing
major-ion composition and
dissolved-solids for groundwater
samples, Star Valley, Wyoming*



EXPLANATION

Total dissolved-solids concentration, in milligrams per liter,
and U.S. Geological Survey salinity classification (Heath, 1983)

- Less than or equal to 999; fresh
- 1,000–2,999; slightly saline
- 3,000–9,999; moderately saline
- 10,000–34,999; very saline
- Greater than or equal to 35,000; briny

Appendix F-6. Trilinear diagrams showing major-ion composition and dissolved-solids concentrations for groundwater samples from wells and springs in Star Valley, Wyoming.

Geology – Interpreting the past – providing for the future

